January / February 2005 >> Vol.18

Riding the JetStream

NavisWorks looks to streaming technology



AEC MAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

Portable power

CAD on the move with the mobile workstation

Smart thinking – The future of architectural design with generative modelling?

AEC MAGAZINE
DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

EDITORIAL

Publishing Director: Martyn Day
Email: martyn@edaltd.co.uk

Managing Editor: Greg Corke
Email: greg@edaltd.co.uk

MCAD Technical Editor: Alistar Lloyd Dean
Email: al@edaltd.co.uk

Designer: Stuart Wilkes
Email: stuart@edaltd.co.uk

Publisher: Geoff Walker
Email: geoff@edaltd.co.uk

PRODUCTION

Production Manager: Dave Oswald
Email: dave@edaltd.co.uk

ADVERTISING

Group Advertising Manager: Peter Jones
Email: peter@edaltd.co.uk

Deputy Advertising Manager: Steve Banks
Email: steve@edaltd.co.uk

Advertising: Geoff McDonald
Email: geoff@edaltd.co.uk

Accounts Manager: Terry Wright
Email: terry@edaltd.co.uk

SUBSCRIPTIONS

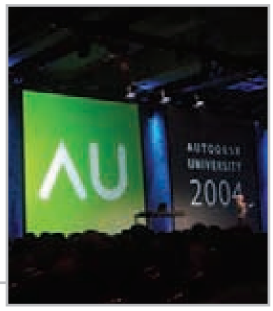
Database Manager: Alan Cleveland
Email: alan@edaltd.co.uk

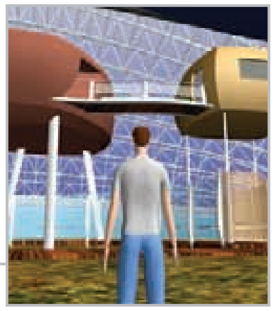
Free Subscriptions: AEC Magazine is available on free subscription to readers qualifying under the publisher's Terms of Control.

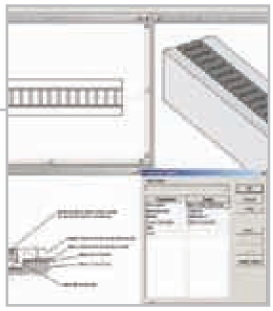
Paid Subscriptions: AEC Magazine is available on paid subscription at the following rates: UK – £36 per annum; Overseas – £50 per annum. Cheques should be made payable to Electronic Design Automation Ltd

EDA Ltd. 63-66 Hatton Garden, London EC1N 8SR
Telephone: 020 7681 1000 Fax: 020 7831 2057

EDA PUBLICATIONS











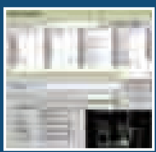
STAAD.Pro special edition



Research Engineers has released a new version of its flagship structural design solution, STAAD.Pro 2004 SE.

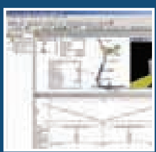
Core facilities include model generation, static, dynamic, p-delta and non-linear analyses and steel, concrete and timber design. STAAD.Pro supports over 40 international and domestic design codes for steel, concrete, timber, aluminum and cold-formed steel. ***www.reiworld.com***

CADopia IntelliCAD 5 ships



CADopia has announced that CADopia IntelliCAD 5 is now shipping. The new and improved features in CADopia IntelliCAD 5 include: Open and save AutoCAD DWG 2004 and 2005 format files, Import and export DWF files, Multiple tabbed layouts for drawing display, Lineweights support for display and printing, and Audit and recovery of damaged files. CADopia IntelliCAD is available in 3 editions – Standard, Premium, and Professional. ***www.cadopia.com***

Managing water distribution



According to its developers, the latest release of Wallingford Software's InfoNet, version 2.5, now manages asset data for water distribution networks to the same level of detail as for collection systems. InfoNet is purpose-designed for the store, integration, validation and analysis of network data to provide accurate information and reports, both up-to-date and historical, on hydraulic network infrastructure and performance, presented in easy-to-use formats. ***www.wallingfordsoftware.com***

form.Z 5.0 released



auto.des.sys, has announced the release of form.Z 5.0. According to its developers it is a rather unusual release in that, in addition to a number of significant new features, it includes a new open architecture that supports the development of extensions to form.Z. These can be of two types: plugins that may be developed using the new API or scripts that are developed from within form.Z using the new FSL (form.Z Script Language). ***www.formz.com***

More news stories, updated daily, at:
www.cadserver.co.uk

3D PDFs created in MicroStation



Bentley Systems has announced that MicroStation users will be able to include 3D models and animations in Adobe PDF documents. MicroStation V8 2004 Edition users can already create interactive files in Adobe PDF that contain DGN and DWG drawings, project documentation, and engineering data. With this advance, and for the first time from any product, users will also be able to include interactive and animated 3D models in PDF files.

Using the PDF files created with MicroStation, professionals, their partners and clients, and the public need only Acrobat Reader 7 to view animations and interactively explore 3D models of engineering projects. A full set of navigation tools in Acrobat Reader 7 also lets viewers selectively control the visibility of model geometry, move to predefined viewing locations, and adjust display modes.

As Ray Bentley, executive vice president of software development for Bentley, explains, "This functionality brings 3D design data to a whole new class of user. Designing in three dimensions has always been valuable to engineers and architects, but for the most part, the 3D data has been used only for design and construction or manufacturing. Now that the 3D data can be contained and presented efficiently within PDF documents, it can also be used in many other areas, including training, sales, product documentation, marketing, and technical support." ***www.bentley.com***

Arroway releases high-res textures DVD

Arroway Textures has released "Textures - Edition One", a collection of 102 multi-layered, seamless and high-resolution textures on DVD.

Nearly every texture consists of diffuse, bump and specular/glossiness map. These extended maps are the product of specifically developed tools that extract this information from the source material. Additionally every map was post-processed by hand.

All of Arroway's textures are made only from photographic material and provided only in high-resolution. The textures of this collection come in resolutions of up to 64 megapixel (8,000 x 8,000 pixels).

For every texture that Arroway creates, up to 50 single photographs are used. All these pictures have to be stitched together by hand to get one really high resolution image. Arroway also carries out additional steps to remove perspective distortion, to eliminate the seams and to extract the extended map information. Finally every map is post-processed by hand. It takes several hours and up to one Gigabyte of data to complete the work for one multi-layered texture.



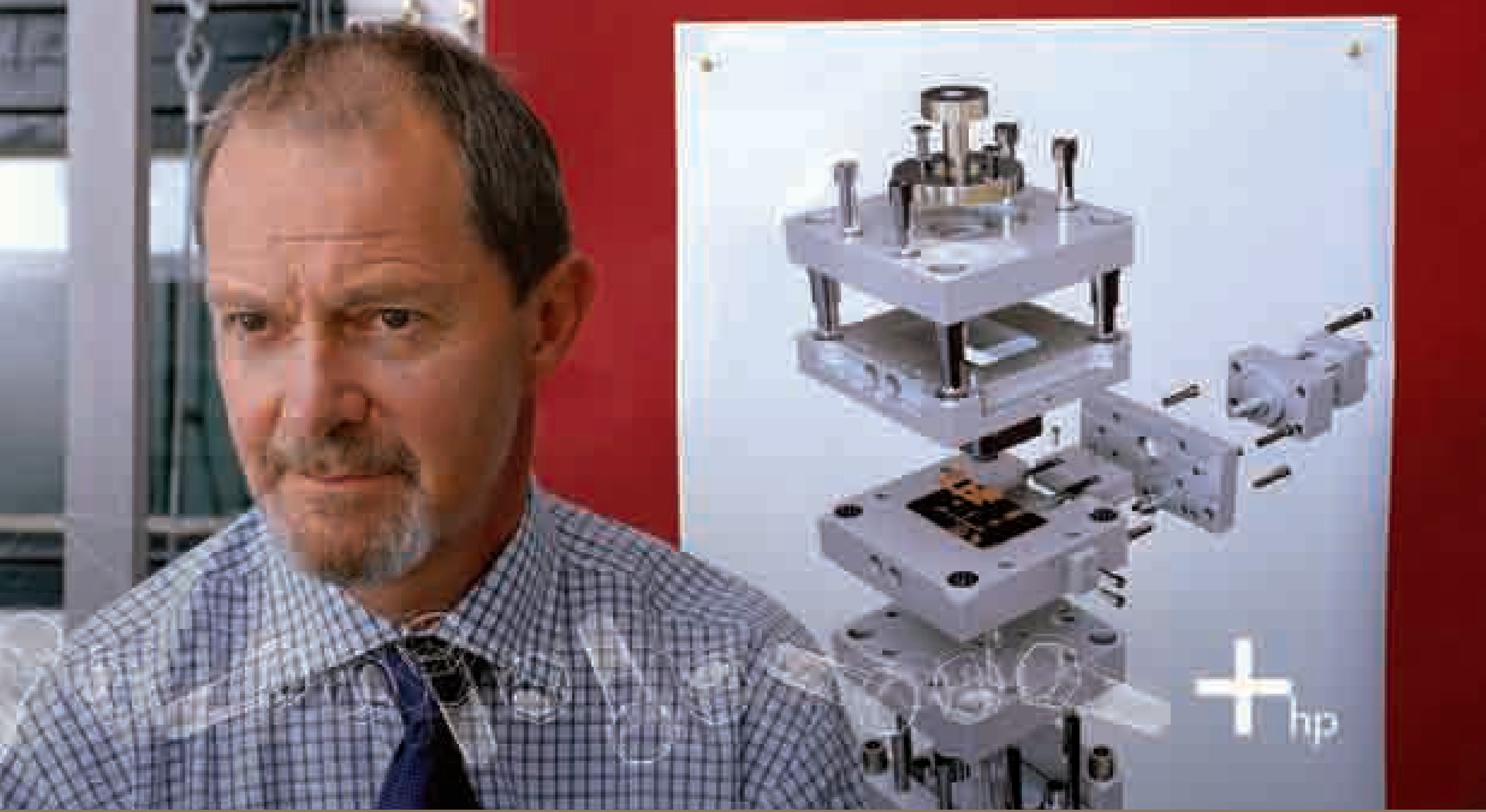
A preview version of every texture is available for free download. The DVD contains 288 maps - all lossless compressed. ***www.arroway.de***

Building Systems users receive upgrade

Subscribers to Autodesk Building Systems will be automatically upgraded with a new version of Autodesk Building Systems Tools (ABS Tools). This new release gives mechanical, heating and plumbing engineers more key UK-specific content, plus increased functionality to further streamline workflow.

New content includes additional DW/144 compliant duct fittings and greater support for UK ductwork standards as well as new MvParts across all disciplines, including many new parametric items. There are also new pipe catalogues (including cast iron and crimped) supporting more flange types as well as localised wire sizing databases and tools for dynamically rotating and re-positioning in-line equipment.

"This further underlines Autodesk's commitment to a fast track programme for ABS development in the UK and moves us a step closer to our goal of becoming the industry standard platform for building services design" says Simon Jones - ABS Technical Manager, Autodesk UK. ***www.autodesk.co.uk***



Ideas made real in 25 seconds*

Get ahead of all your complex print jobs by doubling your print capacity[1] with the revolutionary new HP Designjet 4000 Printer. It uses unique HP Double Swath technology to cut production time of large volumes by half. That's up to one hundred A1 line drawings and detailed plans in just one hour.** All from a new HP Designjet that's been built to be as reliable as every HP Large Format Printer in our range. Combine this latest technology with HP Inks, Printheads and Large Format Papers and you have the fastest, most efficient way to share the most complicated ideas with the rest of your team. Get up to speed now at www.hp.com/eur/dj4000/model



HP DESIGNJET 4000/PS

PRICE FROM
£7,600† ex VAT £8,930† inc VAT
Order ref: Q1273A/Q1274A

- 100 A1 prints per hour** with HP Double Swath technology
- 2400 x 1200 dpi maximum resolution
- Embedded processor and web server
- 256 MB (expandable to 512 MB), 40 GB HDD
- Control operational costs through Job Accounting features
- Supports HP-GL/2, HP RTL, TIFF, JPEG, CALS G4 and Adobe® PostScript® 3,™ PDF 1.5 on PS model

Upgrade to **HP Care Pack:**
3 years next day onsite response
H5655A/E £845 ex VAT £993 inc VAT



HP INKS & MEDIA

Consistently outstanding results with HP original supplies

- Choose from a complete set of No. 90 ink supplies to match your usage needs and benefit from lower running cost options
- No trimming and cutting time wasted with new HP European standard format media rolls
- Rolls up to 91m long and 42" (1.06m) wide

Adobe Includes Acrobat Professional Software

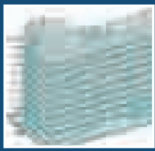
For trade-in opportunities and product details go to www.hp.com/eur/dj4000/model today.

CALL	**0870 443 6290**
CLICK	**hp.com/eur/dj4000/model**
VISIT	**your local HP reseller**

hp ® invent

*A1 mechanical printing time. **Multi-copy printing.*/**Printed in Fast mode on HP Bright White Inkjet Paper (Bond). Speed indicated is maximum printer speed. [1] Compared to any HP Designjet 600/700/800/1000 Printer series. †All prices are MRSP (manufacturer's recommended street prices) from HP in-/excluding VAT. Offer only valid whilst stocks last. Adobe and the Adobe logo are either registered trademarks or trademarks of Adobe Systems Incorported in the United States and/or other countries. Adobe® PostScript® 3™ are trademarks of Adobe Systems Incorporated

CSC updates structural tool



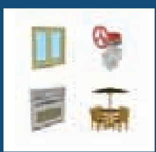
The latest release of the 3D+ CAD System for Structural Engineers contains a range of new features. These include AutoCAD 2005 compatibility, enhanced monolithic modeling for concrete structures, parametric neutral files for "library items such as stairs, and pile caps, bi-directional links to CSC's Fastrak Building Designer, and new slab cutting and material listing commands. ***www.3dplus.info***

iiyama TFT targets CAD



UK trade-only distributor ArtSystems has unveiled the latest addition to the iiyama LCD monitor family, the ProLite E485S. According to ArtSystems the 19" TFT LCD monitor offers an excellent contrast ratio of 800:1, double that of most models available, providing brighter, clearer and sharper image quality for colour intensive applications. It also incorporates a faster response time of 20 ms, which is perfect for 3D-CAD or animation applications, as the moving images appear more precise. ***www.artsystems.co.uk***

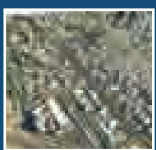
SketchUp components online



@Last Software has announced the availability of SketchUp Component Libraries for use in the film and stage, interior design, landscape architecture, and architectural and mechanical design industries.

The libraries contain hundreds of commonplace 3D images that SketchUp users can employ to enhance their designs. For instance landscape architects might insert images of trellises or patio furniture in their garden design. ***www.sketchup.com***

Visualisation for Civil 3D



RDV Systems has announced the availability of RDV 2005 for Civil 3D. Rapid Design Visualization (RDV) is an application developed specifically for use with Civil 3D, Autodesk's new generation of Civil Engineering design software. RDV 2005 enables any Civil 3D user to create a fully interactive visualization environment, such as drive through simulations or flyovers directly from their Civil 3D project. ***www.rdvsystems.com***

More news stories, updated daily, at:
www.cadserver.co.uk

National building height database

Aerial mapping specialist, BlueSky has launched Point-Z, a national database of land and building height measurements that holds the height above sea level for any given point in Great Britain. Point-Z comprises a grid of billions of survey points collected every five metres or less using remote sensing technology. Height accuracy varies from less than one metre to as little as five centimetres for selected areas such as high-risk flood plains and coastal zones.

Point-Z data has many applications from civil engineering, flood risk assessment, and quarrying to mobile network planning, railway engineering and personal navigation. According to Bluesky, the Point-Z database is revolutionary as it is based entirely upon data collected by remote sensing, the science of gathering information concerning the earth that does not involve physical contact with the surface. It is designed to replace traditional contour maps that were drawn-up following costly and time consuming land surveying work.

The Point-Z database is primarily made up of NEXTMap Britain, a terrain map of the whole of Great Britain created by Intermap Technologies. Additional Point-Z data is derived from other remote sensing methods such as aerial photography and LIDAR (Light Detection and Ranging), which is used for areas where centimetre accuracy is required. The standard format is an XYZ text file, but other formats for more experienced users across a range of software are also available. Every individual point in the Point-Z database will be tagged to provide information (meta data) about the grid spacing, height accuracy, date, acquisition method, copyright and whether it is an bald earth indicator or a first surface height for features such as trees or buildings.

Elevation points may be used in isolation but their real value lies in providing the 3rd dimension in maps when viewed as contours or with software to create cross sections and most spectacularly real world visualisations and fly-throughs when matched to aerial photography. These 3D landscapes and cityscapes, can be modelled to reflect proposed development such as new buildings, roads and quarries as a useful aid for planners, architects and civil engineers. Applications for road vehicle telemetry and synthetic vision for fog bound aircraft are also being developed. ***www.bluesky-world.com***

Pure ray-tracing card optimised for Mac

ART VPS has announced the latest release of PURE - accelerated rendering hardware specifically designed to harness the core graphics technologies of Mac OS X and high performance of the Power Mac G5.

The new system employs a modular ray-tracing architecture that accelerates 3D rendering by distributing it across an array of dedicated rendering chips. According to ART-VPS users can generate full-frame previews in seconds and utilize advanced features that include multiple area lights, accurate 3D motion blur, secondary illumination, camera properties, and special RenderMan shaders. The latest generation of the PURE PCI card contains eight ART VPS AR350 dedicated ray-tracing processors. ***www.artvps.com***

CA Design helps move retail plans online

McArthurGlen UK, a leading retail sector designer outlet developer and operator, has chosen SpaceStation, a web-enabled property database from Norfolk-based specialist C A Design Services Limited. SpaceStation is being used to manage its CAD drawing data online by holding and displaying plans of centres and shop units, incorporating over three million square feet of space. Hundreds of plans for each outlet centre have been scanned and stored in the searchable SpaceStation database, creating a secure paperless filing system and saving valuable storage space. The system has the benefit of freeing-up McArthurGlen's CAD data in a read-only, secure environment to other departments and organisations. ***www.mcarthurglen.com*** ***www.cadesignservices.co.uk***

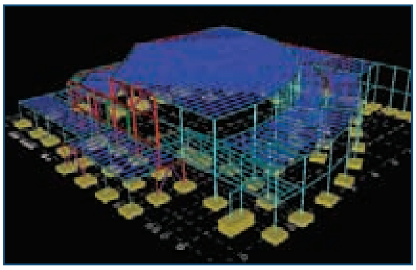
Océ introduces professional print series

Océ has introduced the Océ TDS800 Professional Series, a high-throughput wide format printing system, which combines Océ Copy Press technology with the flexibility of a highly configurable system. It offers a choice of print speeds from 6, 8 or 10 A0's per minute and scanners from 13 or 5 metres per minute. Flexible media options from 2, 4 or 6 rolls, as well as a choice of finishing options complete the diversity of this series. Rolls of 200m offer a total capacity of up to 1,200m of continuous printing and there are numerous finishing possibilities including a selection of belt units for maximum unattended productivity, whilst unfolded output is handled by the Océ Copy Delivery Tray. The integrated folder offers different modes, as well as time-saving options for punching and hanging strips.

Meanwhile, Océ has further increased the media handling flexibility and capacity of its TCS400 colour printing, copying and scanning system with the addition of a third media roll and a copy receiving rack. ***www.tds.oce.com***


Now you can make changes as fast as they think them up.

Structural link formed for ADT



RAM International and Advanced Micro Systems (AMS) have released ADTlink, a software tool for exporting analysis/design models from the RAM Structural System, for integrated analysis, design and drafting for all types of building structures, to Autodesk's Architectural Desktop.

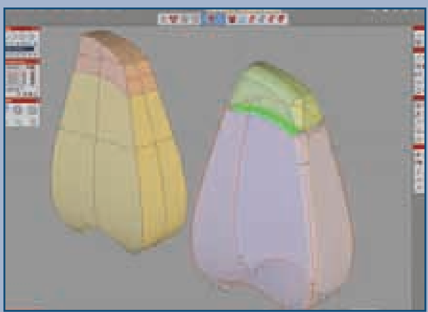
ADTlink runs inside of Architectural Desktop 3.3, (2004 and 2005) and allows the user to select a RAM Structural System model for import. Steel and concrete members are brought in as 3D structural entities from the model and translated into ADT. The utility is flexible and allows the user to define custom steel and concrete slabs and footings as styles in Architectural Desktop. Uses in Architectural Desktop can range from checking interference conditions to renderings in a presentation.

ADTlink is designed to eliminate the error prone process of manually coordinating the structural model with the rest of the disciplines by automating the process of importing a RAM Structural System model into ADT as native members.

As both an Authorized Autodesk VAR and a RAM International Strategic Development Partner, Advanced Micro Systems claims it has been able to provide a level of integration between the two software platforms that is not available from any other source.

www.amsystems.com / www.ramint.com

Creative users targeted by NURBS modeller



Eovia, developer and publisher of 3D animation, modelling and rendering software, has launched Amapi Pro 7.5, the first major update of Amapi Pro, the NURBS 3D Modeling Workshop.

Amapi Pro is a creative tool used for the conception, modelling and assembly of 3D objects and scenes in Product Design, Architecture and advanced 3D model creation with a user interface designed for the creative professional. According to the company, it integrates all advanced technologies of NURBS modelling while still preserving the legendary creativity of the Amapi product line.

The principal innovations of Amapi Pro 7.5 include a more complete 2D drawing toolbox with a new Bézier curve drawing and edition tool, a full set of advanced NURBS snapping assistants allowing the designer to get instant and dynamic access to all singular points and directions related to existing curves: extremities, tangents, perpendiculars, intersections, and more.

Amapi Pro 7.5 also offers a new Dynamic Geometry Navigator enabling full access to the object construction tree and allowing easy and instant control on all level of components of the model. The new version also brings a high-level module for texturing and photo-realistic rendering, based on Carrara 3, and a NURBS Box-modelling tool to combine the flexibility of Box Modeling techniques and the power of NURBS representation.

Moreover, Amapi Pro 7.5 now includes NURBS variable-radius filleting and from a rich set of CAD imports/exports formats including STEP, SAT/ACIS and OpenNURBS formats.

www.unlimited.co.uk/3Ddesign

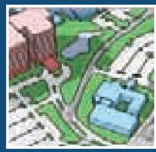
Princeton to use Catia V5 for architecture

Dassault Systèmes has turned to the education sector to help increase awareness and expertise for its core 3D product, Catia. The French company has announced a new partnership with the engineering and architecture schools at Princeton University whereby DS will provide selected PLM (Product Lifecycle Management) solutions for education and research.

Princeton faculty members will integrate Catia V5 in their aerospace and mechanical engineering and architecture curricula. Dassault Systèmes will work closely with Princeton engineers and architects to adapt curricula to coincide with the continuing evolution of industrial processes that Catia V5 is helping to define.

Dassault Systèmes works closely with Gehry Technologies, which provides building delivery technologies to the AEC industry. Therefore, the new partnership will provide a teaching opportunity for the architecture school at Princeton, where Frank Gehry is designing a new science library. ***www.3ds.com / www.gehrytechnologies.com***

SketchUp forms links to GIS



@Last Software has announced the ability to exchange files between SketchUp, its simple to use 3D product, and ArcGIS. This interoperability gives GIS users the ability to rapidly create 3D models in SketchUp, incorporate the models in to their GIS database, and then display them in ArcScene and ArcGlobe, ESRI's 3D viewing environments. The user can then visually explore the model in 3D, fly over the landscape, fly around buildings, go inside the buildings and look around, and then look out the windows of those buildings and see the landscape, all in the context of their GIS information.

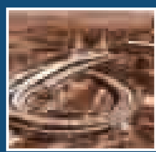
www.sketchup.com/gis / www.esri.com

Fire added to Intellistation



ATI has announced the introduction of the FireGL V3100 as an option in IBM's PCI Express based workstation, the Intellistation M30. The FireGL V3100 features 128MB of memory, 4 pixel pipelines and 2 vertex processors, with dual display support via VGA and DVI outputs. The IntelliStation M30 is IBM's Pentium 4-based workstation with speeds up to 3.8GHz. ***www.ati.com / www.ibm.com***

Excitech gets behind Civil 3D



Excitech has been awarded ASC+ status for Autodesk's new Civil 3D software, a civil engineering tool that creates intelligent relationships between objects so design changes are dynamically updated. As part of Autodesk's introduction programme for Civil 3D, Autodesk resellers have been required to demonstrate their understanding of civil engineering design as well as their skills with this new software. ***www.excitech.co.uk***

New 2.5D RPC libraries



ArchVision has announced the availability of two new RPC (Rich Photorealistic Content) Moving People libraries. The new Moving Casual People Volume 3 and Moving Business People Volume 2 each include 16 people clothed in traditional casual and business attire respectively Each library includes 16 RPCs. For a full list of supported applications visit ***www.archvision.com***

More news stories, updated daily, at:

www.cadserver.co.uk

Autodesk Price increases

From the start of February, many Autodesk products, upgrades and subscriptions have gone up in price. Martyn Day evaluates the impact and questions the reasons why and talks to the head of Autodesk Europe.

Martyn Day

Following hot on the heels of the AutoCAD 2000i 'retirement', Autodesk has introduced a broad range of price increases on most products, upgrades and subscriptions. A small number of products have seen some decreases but in the main, the prices have been raised between 5% and 47%. Since mid-January some dealers have been broadcasting the forthcoming increases on their websites and in mail-outs to their users, in an attempt to pull business forward of the February price increases. While this is the way the dealers have reacted, I see the main aim of the pricing changes was not to pull sales forward, but to make the case for Autodesk customers to go on Subscription.

The first reaction to this was seen on Ralph Grabowski's WorldCAD access 'web blog', where a customer of UK dealer, Excitech, wrote a letter of complaint. The unidentified user wrote, "My firm's multi-hundred licenses are all on subscription. In March 2004, a single-step upgrade (AutoCAD 2004 to 2005) was £300 (list price, before corporate discounts). It will cost £440 from 1 February, a 47% increase.

"A subscription is still cheaper than upgrading, but I have to ask: am I getting 47% more value to my firm from upgrading? The answer is no.

"The 24% increase for annual subscriptions is the real pain, because Autodesk UK withdrew the discount they used to give for subscription renewals. This means that my 2005 subscription renewals are a whopping 44% more than they were in 2004. I think you can imagine the upset that one causes!"

Where are the price increases?

Looking at the range of price increases, the biggest have most certainly been in the upgrade and subscription component of Autodesk's offerings. The boxed product has increased between 5% (vanilla AutoCAD) and 17% (AutoCAD Map 3D), while the big percentage increases hit AutoCAD upgrades, which have risen by 47% and AutoCAD Subscription up 24%. I have not been able to substantiate any change in discount for subscription renewals, one can only assume that the customer had been reliably informed by his dealer concerning his multi-copy discount entitlement.

The changes come in what promises to be an interesting year for Autodesk. The company has appeared to emphasise a Subscription-based model, as opposed to marketing and selling upgrades. With Subscription, Autodesk customers pretty much pay for the next release of AutoCAD, which now comes out yearly, around March and they also get on-line support, together with web-based e-learning tools. Autodesk had tried to stream additional functionality within the subscription period but appears to have dropped this idea, in favour of the yearly release, where subscribers 'pay forward'. A recent and very welcome addition to the Autodesk Subscription offering is that customers can use whichever version of AutoCAD they wish, so subscribers can mix their seats, should they be working on projects that have fixed their AutoCAD version.

From upgrades to subscription

2005 will be the last big year to get AutoCAD customers from upgrades to subscription. AutoCAD 2002 is slated to be 'retired in January 2006 and there are a huge number of customers currently using that release. In the past AutoCAD customers have typically upgraded 'every other release' and 2002 saw the last big migration. At the time, Autodesk's development of AutoCAD came in fits and spurts, with on average, an 18 month gap between Releases. So users upgraded, on average, every 3 years, with Autodesk retiring (at the time the internal term was 'obit") the third previous release (3 x 18 months = 4.5 years) – a time where Autodesk customers have to upgrade or lose the right to get discounted upgrades, effectively paying for AutoCAD again.

Since then, Autodesk has moved to a yearly release program, to enable a subscription business. Instead of delivering hundreds of enhancements per release, Autodesk's development team appears to be adding, perhaps as many as ten major new features with many minor enhancements. This makes each release easier to digest and I have to say the features added so far appear extremely usable and beneficial. However, with an accelerated development schedule and maintaining a 3rd release previous retirement program, Autodesk has compressed the upgrade boundaries. As most users upgraded every 3 years anyway, this perhaps will not affect the majority. However, those that only upgraded when their version of AutoCAD was about to be deleted from the Autodesk price list, will find that this will happen a year and a half earlier than they are used to. So there's a compression in the cycle.

Now come the price increases. In general, prices have gone up but the biggest differences are to be seen in the Upgrade and Subscription costs. Upgrades have risen dramatically by 47% (£300 to £440), while Subscription has increased 24% (£250 to £310). The new pricing makes moving to Subscription the financially best long and short-term option; it's cheaper than upgrading every release and cheaper than every other release and it's certainly cheaper that upgrading at each 'retirement'.

In short, if you are not on Autodesk Subscription and you are committed to using and maintaining the product within your company, you will be throwing money away by opting for the traditional upgrade path. When Subscription and the yearly upgrades were first announced, the price of upgrading yearly or taking up subscription were identical. Since then the prices have changed and this new pricing has put Subscription way out in front as the most cost effective. It seems that if the services and features of Subscription don't appeal to you, the idea is that the cost savings will - although, those that were already on Subscription will have to find more budget to maintain their Subscription licenses.

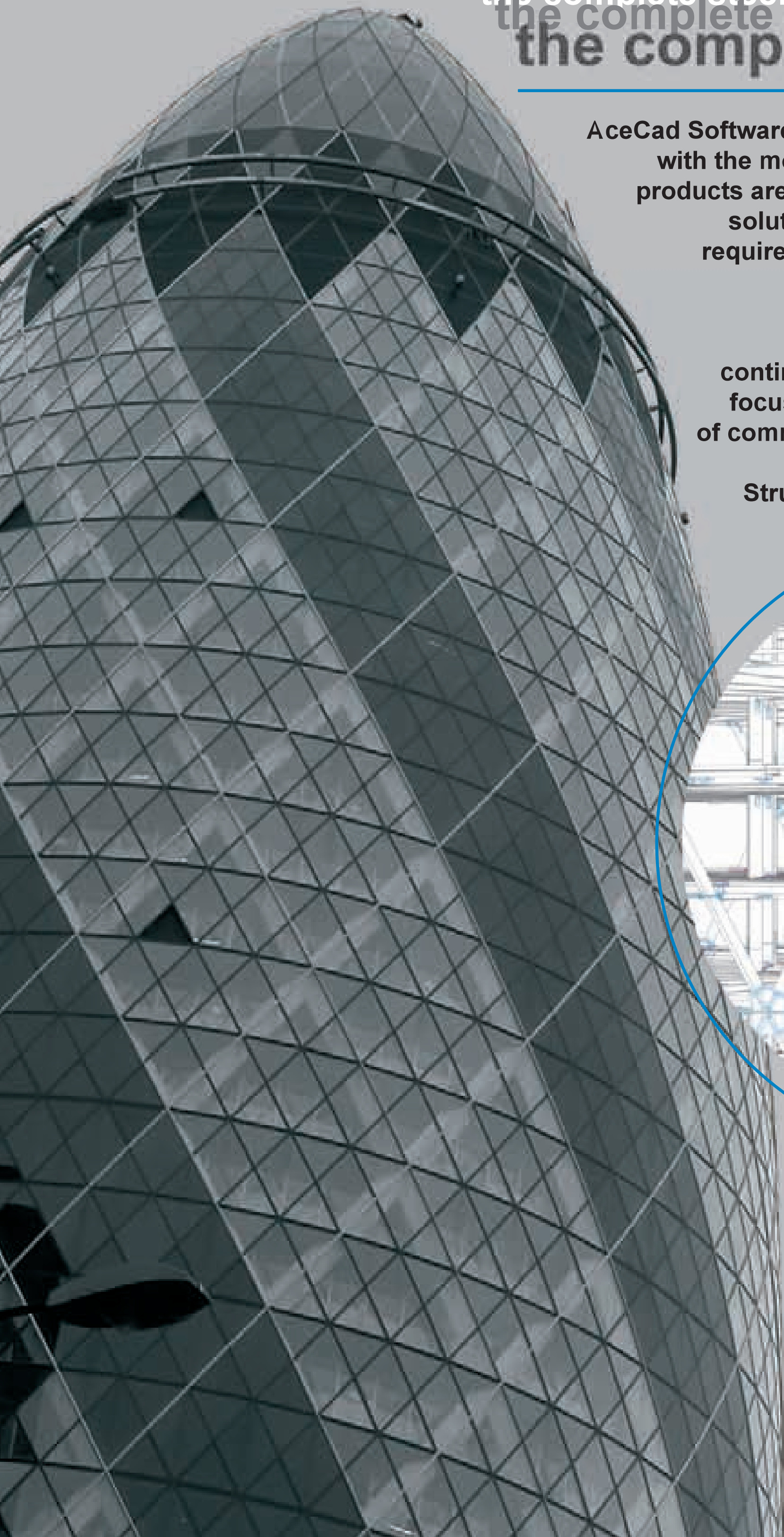
When expressed as a percentage the increase seems to be massive, yet in real terms it will be 60 pounds a seat. Those with a handful of seats may not find this too much, yet large firms with hundreds of seats will be looking for more meaningful sums within their departmental budget. One graphics card vendor pointed out that across-the-board price increases like this leaves 'less in the pot' for hardware, training and other services, which companies may purchase from dealers.

»





The power to integrate

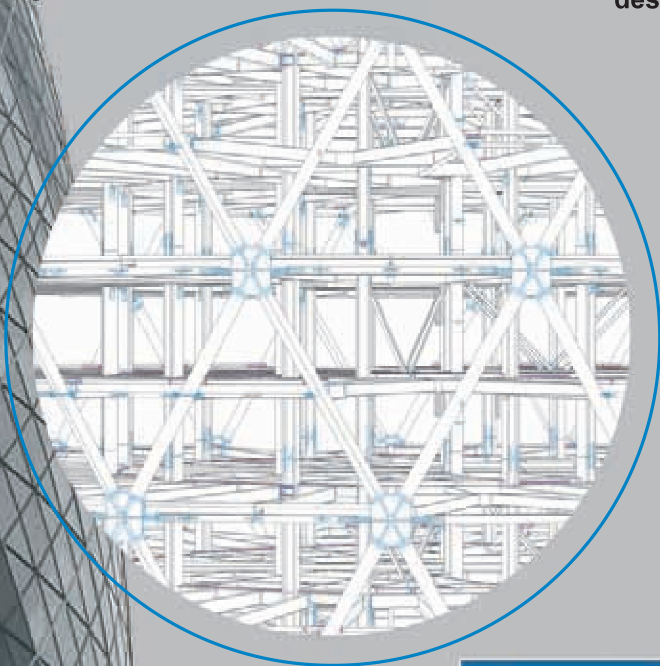


the complete steelwork solution

the complete steelwork solution
the complete steelwork solution

AceCad Software has been providing the structural steelwork industry with the most productive software solution since 1986. All of our products are designed to integrate to form the complete steelwork solution, providing users with the software to fulfil all their requirements from detailing, connection design and analysis through to nesting and fabrication management.

AceCad is dedicated to providing our customers with continued development of our products. With our complete focus on the steel industry we pride ourselves on the level of committed service we supply. In the first half of 2005 alone we already have planned the release of StruCad V11, StruM.I.S 5.2 and StruConnect, AceCad's new connection design program.



AceCad SOFTWARE

www.acecad.co.uk
sales@acecad.co.uk
Tel: +44 (0) 1332 545800
Fax: +44 (0) 1332 545801

AutoCAD LT

Unfortunately, the only way you can go onto Subscription is to take it out at the time of upgrading. So, customers will have to pay to upgrade from their previous Release, to the latest Release first and then pay the Subscription fee on top and if moving from an older Release, this compound upgrade and paying forward for the next (sub) can be a hefty sum.

Looking at Autodesk's AutoCAD LT sales (in the UK selling over 7 copies of LT for every full copy of AutoCAD), I would hazard a guess that many customers are opting to buy the much cheaper AutoCAD LT instead of upgrading. It's a way of staying in touch with the new features and any changes in the DWG file format without having to maintain AutoCAD seats. LT has grown to be one of the biggest revenue generators for Autodesk and this has not gone unnoticed. Over the years, AutoCAD LT has risen from its introductory price of £495 to the new price of £880. At that cost, I think LT is still good value but it's been quickly heading towards the £1,000 mark. The new price also makes for some interesting decisions when opting to either upgrade, put an existing AutoCAD on Subscription, or just use that money to purchase a new LT seat. In the past, the LT option was a better deal on price, now that's less of an issue.

There could be some danger that by pricing LT so far out of the budget end of the CAD market, a competitor could appear. However, customers of LT are mainly buying the software as it's a 'cheap AutoCAD', being more interested in its DWG compatibility and familiar interface, than looking at a competitive and capable product such as TurboCAD.

Autodesk's model

Autodesk has had an amazing couple of years. It's financially healthier than it's ever been and this year it should break well beyond the $1 billion barrier. Towards the end of last year its share price hit an all time high and it has consistently beaten the analyst's projected earnings. Out of all the CAD companies that I cover, Autodesk is certainly leading the way in the financial markets.

At the moment Subscription is contributing well to Autodesk's model but the coming year, with the 2002 retirement, presents the company a great opportunity to swell the Subscription numbers and maintain that revenue momentum. For the UK, these price increases are the final part of the business jigsaw to position Subscription as the best value and move the core base of users to paying ahead for releases, with the added benefit of web support and training.

The UK issue

On the issue of the UK getting these price increases, I talked with Mark Paraskeva, Autodesk's VP of, Northern Europe. Paraskeva first addressed the issue of the frequency of upgrades, "As to the upgrade schedule, for us that is driven by a rate of software development that our customers need in terms of new features. We are in the business of making better software and new releases are all in response to what our customer's want. Customers actually have a choice, if they want to move to those releases or, in fact, stay on the old one."

I pointed out that there was a price penalty for doing this, Paraskeva replied, "There is, but it depends on how you look at it. The price of AutoCAD is around £3,300 and an upgrade is £440, which is a little bit over 10% and if you don't upgrade for two years then you pay £880, which is about 20%. I think the cost of 10% a year isn't really significant for keeping a product current. At the end of the day the customer always has a choice to be happy with the current version and continue running it. When customers move to a more powerful version of the product, more features, more capability, they are typically doing it with the sole reason to improve their productivity and their output."

Paraskeva reiterated, "We are delivering important improvements and typically with these products we are giving our customers better productivity, reduced time to market and more capability and yes it costs to upgrade and it costs to keep current, but the reality of the fact is that our customers derive huge value from the use of our products."

I then asked about the why it's mainly the UK that has seen price increases, Paraskeva responded, "This is not a price increase that applies around the world. We discovered that for some reason the UK pound pricing had historically been very low and customers were getting a great deal. And the actual percentage that we have moved it to is exactly the same price that customers pay around the world." This confused me, so I asked him if he meant that if I were to convert the UK price to dollars and then compare that to the US price, they would be the same? Paraskeva replied, "What I am saying is that the £310 (Subscription) of the total price (AutoCAD), as a percentage, is the same across the world."

So, how about the growing price difference between the UK and US? "There are differences between US and European rates and a lot of it is the cost of doing business, our costs here are higher, which is similar for all international IT companies," explained Paraskeva.

I then explained that the majority of our readers run CAD departments, are CAD managers and have departmental budgets. Increases like this impact what they can do and they see Autodesk just taking a bigger chunk of their technology budget. Paraskeva was persistent with his message, responding, "If you sit down with our customers and see what massive value they derive from our products, it's very significant and customers have a choice"

While we argued around in circles, you can't really argue that customers don't have a choice, the question is what kind of a choice is it? Go on Subscription and save money (get some services too), upgrade every year and pay a bit more without any services, go a la carte and upgrade any time with the 3 Release cycle (3 years) and pay even more money, or completely go wild and upgrade every 4, 5 or 6 years, opting for Autodesk's legacy program, which offers any user on any old release 30% off a full priced copy, so long as you take Subscription out at the same time. There is choice but only for the financially insane.

One could of course jump ship to another CAD vendor's product, but then there are many associated costs involved including training, legacy data, etc. Bentley Systems for one has picked up on this with its latest marketing campaign.

> A subscription is still cheaper than upgrading, but I have to ask: am I getting 47% more value to my firm from upgrading? The answer is no. *Unnamed Autodesk customer*

Conclusion

The cost of AutoCAD ownership is going up. Autodesk appears to be extremely adept at manipulating its business model to get the most out of its customers. The software development at the company has similarly improved and the products have never looked better. However, there is a distinct mismatch between the value that Autodesk thinks it's delivering and the customers realization of what they are getting for their money and this leads to customer alienation.

Over a year ago, Autodesk carried out a questionnaire of its customers and the response to one question shocked the current COO of the company, Carl Bass into writing an internal email urging action. The question concerned whether customers thought Autodesk cared about their businesses and the majority replied 'No'. I would suggest the key driving force behind this was the upgrade model. To me, the recent changes will only serve to exacerbate this feeling, as the release cycle compresses, retirements become more frequent, prices go up and payment for AutoCAD becomes an annual reminder. Customers feel they have little choice but continue this game of 'Simon Says'.

In the meantime, Autodesk appears to be failing to market the value that it is actually adding to both products and services, AutoCAD 2005 and the next AutoCAD are testaments to the renewed energy and vision within the company. Autodesk has to realise that moving to a Subscription/services business model involves a very different relationship with their customers than the indirect one that they have fostered in the past.

Hopefully, there will be a number of offers around this year to ease the upgrade costs and move to subscription. I would suggest you get in touch with your dealer and look at the long-term strategy of moving to Subscription to save money.

Autodesk University Report

In November Autodesk held its annual User event, Autodesk University. With many of its customers now on subscription, the company was more forthcoming about its future plans than usual.

Martyn Day

Autodesk University is the annual US event where Autodesk gives its customers the heads up on what it's developing, together with offering hundreds of sessions aimed at improving knowledge of its many design products, covering AEC, MCAD, GIS, Civils and Visualisation. The event, held in Las Vegas, also provides a two-way communication between customers and Autodesk's executives and product managers.

I wasn't too sure what to expect from Las Vegas, having never been but I had visited another 'casino city' in America, Atlantic City, which all I can say was a dire place. Vegas is built along its airstrip for easy access and has one of the most unusual skylines of any place I've seen. This all changes at night of course, where the place is lit up like a Christmas tree but you still have replicas of the Eiffel Tower, Venetian palaces, pyramids, Hispanic citadels and a range of 1970/80s rectilinear boxes. It's a bit like Disney land but for Adults – it's repulsive yet intriguing! Autodesk hosts its AU event at the MGM Grand, a huge green complex, which is hotel, casino and conference centre all in one. On the casino floor, through which you access everywhere, there is no natural light, and it's kept in a perpetual state of 'evening', which is a tad disconcerting but with a heavy schedule of meetings and keynotes to attend, I knew I wasn't going to waste anytime gambling.

Over the years, my experience of Autodesk has lead me to think that the company has developed a culture which doesn't lend itself to being open about new products, new features or future strategy. As a journalist, this has been like getting blood out of a stone. This trip to Autodesk University in Las Vegas gave mixed messages on this issue but also demonstrated that the company is trying to open up a bit more.

On the day prior to the main event, the press gathered, signed their NDAs (Non Disclosure Agreements) promising not to reveal what we saw until March 2005 and then had a day's worth of presentations on everything that was coming down the line. However, the following day, company Chief Technology Officer (CTO) Scott Borduin presented 60% of what we had seen during his main stage keynote, to the audience of well over 4,000 Autodesk customers, so that information at least was now in the public domain and was reportable, much to the surprise of the company's PR executives.

As Autodesk moves from an upgrade- to a subscriptions-based model you can see the company embracing the concept of disclosure, as customers have already paid for the next release, although some departments within the company maintain reticence.

Keynotes

The first mainstage presentation came from company CEO, Carol Bartz. Bartz is a renowned speaker, delivering her messages with both passion and force, gesticulating as she goes. Autodesk is at an all time high on the stock market and seems to continually outperform its predictions. It looks like Bartz will see Autodesk's revenue shoot through the all important $1billion barrier his year and finally deliver on her original objective when she joined. With the company doing better than well, product development undergoing a renaissance and no real threats on the horizon, Bartz covered the expanded scope of Autodesk's growing product range, about the implications and benefits of the digital lifecycle - what Autodesk breaks down to being 'Create, Manage, Share'.



Bartz gave an impassioned appeal to the audience to keep all the data digital with products like DWF and to embrace change and switch to some of the new generation of 3D products, like Revit, Inventor and Civils 3D and reap the rewards of model-based design.

There are some rumours that Carol is preparing to leave Autodesk and take a more active role in US Government. Having almost certainly hit her target by growing the company to over $1billion, these rumours could well prove true. However, the company is set to have another record year in 2005 and Bartz is obviously relishing the shape and position the company is now in. It will be interesting to see what will happen over the coming months, with the former CTO and now COO, Carl Bass, being the driving force behind Autodesk's product development renaissance and has been widely tipped to be Bartz's chosen successor.

Next up was CTO Scott Borduin, who played straight for the soft spot of the audience by running through some rapid-fire technology demonstrations from across the Autodesk product range. There were very few actual new product announcements at AU and so the technologies displayed were not in shipping products but 'in the pipeline'. It's worth saying here that Autodesk is on a yearly release cycle and the last release was delivered in March 04. Errrm… it's not rocket science is it?

The most breathtaking demonstration was the new technology that's being added to Inventor. Autodesk has always tried to add technology to Inventor without complicating the product and by and large has managed a good job. The new technology looked very similar to the featureless editing and creation of parts that was pioneered in CoCreate's SolidDesigner and Trispectives' IronCAD. There's 'treeless'grip editing of features and 'material' could be dropped in and shaped using existing geometry.

Inventor looks to be breaking the boundaries that most modelling systems adhere to. The net result is that Inventor will get even easier to use and promises better productivity using, what Autodesk is terming, 'Functional Design'.

New AutoCAD features were also demonstrated, offering an intuitive new dynamic input display, placing the command line right on each object in the AutoCAD window, with automatic co-ordinate feedback. This was really cool and obviously useful. AutoCAD will be able to quickly generate tables from attribute data in drawings and new Dynamic blocks provide almost parametric-like capabilities to static blocks – as a table block is stretched, the block will automatically add chair symbols along the table to a pre-defined size.

Borduin also gave a demonstration of the new Civil 3D package that will replace Land Development Desktop and AutoCAD Civils at some point in the future. Here, a 3D



Carol Bartz, Autodesk CEO, delivering her message with passion and force. (Image courtesy of Ralph Grabowski)

road was moved and all the cuttings automatically updated, saving hours and hours of work, as all the views were automatically updated.

The final keynote was given by Dean Kamen, CEO of DEKA and creator of the Segway, a two wheeled thingamajig that caused such a stir last year. Kamen is a visionary and an inventor. His work with gyroscopes has lead to wheelchairs that can traverse kerbs (called the ibot), balance on two wheels (which lead to the Segway) and has worked on many medical devices which improve peoples daily lives. In true fashion, Kamen zoomed up the isle onto the podium on a Segway and then proceeded to give his talk, slowly wheeling about the stage.

I've been to a lot of these type of events and I have to say that Kamen's speech was probably the best I've heard. He has a passion for solving problems, for understanding how things work, with a wit to match and had the audience in the palm of his hand. There was a lot of observation linked to real world projects his company had worked on and he used historical examples too – such as a Chinese cart which had an arm that always pointed North – this was to allow the army to cross huge natural obstacles at night, such as the Gobi Desert. Kamen pointed out that for all the engineering innovation that went into the cart, the Chinese had a simple technology that they could have used hundreds of years earlier – loadstone (naturally magnetic) but they failed to develop the compass.

Towards the end Kamen talked about his concern for young people today, their aspirations and how engineering was not even a consideration for kids today, it lacked respect. Kamen got a well-deserved standing ovation from the audience.

For the rest of the time, there are literally hundreds of hands-on and high-level sessions which you can attend. There's also an extensive exhibition, featuring Autodesk product demonstration booths together with hundreds of developer stands. Most were quite US-centric but there were UK developers present, as well as global partners like Cyco and SketchUp. However, I seemed to spend most of my time in interviews and walking between the hotel and the conference hall! As each day winds up, there's usually some get together happening for users and it's a great time for everyone to have a beer and talk about what information they have picked up that day. If you are a serious AutoCAD user or customer, these kind of events can be exceptionally useful. Also, as Autodesk is fairly US-centric at the moment, it would be good if more European customers attended to give their input and feedback directly to the Autodesk employees- and there are hundreds on-hand.

The AEC sector

From an architectural perspective, Revit appeared to be the product of the moment. On Autodesk's exhibition booth, the AEC portion seemed to just be running Revit demonstrations. I asked if this was an intended move but it seems that all the machines had Revit, ADT and the Civils products on them and it was totally dependent on what the booth visitor wanted to see. From the visible scarcity of ADT, it was clear that customers were taking the University as an opportunity to scope out Revit.

One of the evening sessions was for Revit customers and featured a 'Stump the chump' competition, where a

panel of Revit experts were assembled to model tricky geometry requested by the audience. It was actually quite impressive to see some complex forms being generated in the latest release of Revit. When the chump was eventually stumped, I think one of the customers was getting prompts from a QA tester, who obviously had inside information!

The big news from the event was the launch of Revit 7, together with the fact that SOM were using Revit on the Freedom Tower project in New York. The story is that SOM decided to try out Revit's modelling capabilities on the underground section of the building, which was exceptionally complicated due to the network of underground subways that had to be taken into consideration. The team that used Revit picked up the tool and started running with it. While the original plan was to just evaluate Revit and then revert to traditional CAD for the rest of the Tower, the design team carried on modelling and eventually completed the whole building. For America the Freedom Tower, replacing the towers lost on 9/11, is a project of great cultural significance, and it's probably fitting that the pioneering spirit was used in the way the tower was designed. Revit has not been used to model such a prestigious, or large building before and the product was still new to the team when they started. I am sure we will be hearing more about this as the project progresses.

Revit 7

While on the topic of Revit, the new version offers some major improvements:

Structural Design – Revit could always display structural members but these were mere dumb' positionals'. The new release comes with joist systems, beam setback controls, brace controls and column-grid capability. The beam data is held within the Revit structural model, allowing external applications to access the structural information for analysis. To do this, Autodesk has implemented the first stage of an API (Application Programming Interface), a concept always appeared to be shunned by the Revit developers. This is an admission that Autodesk realises that it can't do all the development it needs to do and so will work with specialist partners.

Concept Modelling Tools – One of the key new features of Revit 7, is the conceptual modelling tools, called Building Maker. This capability allows architects to mass model in a fluid manner and maps these conceptual elements to building model elements, walls can be created from any vertical face, curtain walls ca be generated from any massing face, rooves can be created from sloping or horizontal faces and floors can be generated from floor area faces. The conceptual model is linked to the Revit model and remain associated and can be updated as the conceptual model changes.

Stacked Walls – It's now possible to create walls where there are changes in thickness, at different heights. These sub walls can also be scheduled for quantity take-offs.

Sub Region tools – These are new sketch defined areas hosted on toposurfaces. They can be moved and edited, have names, materials and areas and appear in toposurface schedules.

Nudge Tool – Placement of elements is critical in any modelling system and Revit 7 now enables the arrow keys to move elements by 1 snap unit – if you hold the shift key at the same time, it will move 10 times the current snap unit.

Revision Tables – Revit 7 supports revision numbering by project or by sheet. Revision clouds, which can be tagged, displaying a revision number, which can be added to a new global Revision Table, listing all revisions in the current project. New revisions can be created or merged with existing ones.

Viz Support – There's a new plug-in to allow Revit models to be easily imported in to Autodesk Viz 2005, complete with the Revit materials to create great rendered images. This is great news, especially as the AccuRender component in Revit, is starting to show its age.

Presentation Views – Building on the presentation theme, Revit can now easily create presentation graphics without using a rendering engine: 2D and 3D vectoral shadows, within OpenGL views, silhouette edges, sectional perspectives and linework support in perspective views.

3D ACIS Solid Support – While this may seem an odd addition, Revit now has the ability to bring in ACIS 3D solid data (this may be Autodesk's interpretation of ACIS created by their ShapeManager variant, as opposed to true ACIS solids). It means that elements like Mechanical parts (boilers etc.) can be brought into and displayed within Revit models.

ADT and Revit

One of the confusing parts of Autodesk's AEC strategy is the difference between Architectural Desktop and Revit. ADT is AutoCAD-based, Revit is a new code base. ADT is portrayed as the AEC flavour of AutoCAD, while Revit is the parametric modelling tool for those that want to improve their business process. I think the differential is becoming clearer, although the one thing that is confusing is the building verticals that are being added to both product lines.

One of the key tenets of both ADT and Revit is that there is a single model in which all the data can be held. To complete on the deal, Autodesk has to provide intelligent elements, such as building services and structural elements. Autodesk has already released a building services add-on for ADT, the well named, Autodesk Building Services but has no structural package. However, Revit now has the structural elements but no building services! It's not yet possible to completely model all the key elements in either, yet each of the missing parts is available in the other.

The reason for this appears to lie in the fact that when Autodesk bought American developer Softdesk, the AutoCAD building services application came as part of the deal. Revit is following the more logical architectural- structural- building services route to development. It also makes me consider the huge efforts that Autodesk is having to put into development of not one but two AEC modelling tools. An Autodesker admitted that originally, when Revit was purchased, development of ADT was scaled back. However with the on-going success of ADT and the challenge of introducing a new product and a different way of working, the two teams are now balanced.

In a big change to stated policy, Revit now features an API (Application Programming Interface). This will allow third party application to plug into Revit and offer additional functionality. I think this will seriously help speed Revit's development and capability. The API approach worked for AutoCAD, so I see no reason why I should be any different for Revit.



Free rides on a Segway at Autodesk University.

Conclusion

Since the development of AutoCAD 2004 to the technology keynotes at this year's AU, Autodesk development has undergone a bit of a renaissance, with all the products starting to look great, across a massive range of vertical markets. I thought AutoCAD was pretty much at the end of its life. I mean, what else could be added to a 2D CAD system to make it do any more after over 20 years of development? Autodesk's roadmap is now proving that there's plenty to be added to seemingly an old product.

Unfortunately I can't tell you too much about what's coming down the line but the 'tasters' given by CTO Scott Borduin were really impressive and they will all be useful when they come out. Autodesk is on a yearly cycle and the last release was in March 04. There doesn't seem to be any reason to suspect that the company is behind schedule.

For those on AutoCAD 2002, the product will get its obit in January 2006, less than a year away. The upgrade this year will be the best opportunity to get onto Autodesk's Subscription service. While some may not really require on-line support, or training, the new pricing makes Subscription the best value over the short, medium and long-terms (See article page 11) as upgrades have seen some steep rises.

www.autodesk.co.uk

Online collaborative tools for mapping

A new generation of online services are now allowing diverse project teams to collaborate and manage geographic information more efficiently says James Cutler, CEO at eMapSite.

James Cutler

The AEC sector is characterised amongst other things by the paradox between project-specific detailed mapping requirements and contextual corporate mapping demands. Organisations face different challenges in locating, accessing and exploiting digital mapping data in these overlapping scenarios.

Day-to-day – users demand…

The last few years have seen the emergence of increased choice in and multiple sources for digital mapping and related products; just in terms of aerial photography, transport network and routing information, terrain data, building heights, environmental and ground stability data, there is already a wealth of suppliers over and above the core offering from the sector's main traditional supplier, Ordnance Survey (OS).

As OS itself faces up to these and other challenges, project-centric users in the AEC sector are increasingly turning away from multiple supplier relationships and seeking out single source solutions for their enterprise.

At the most prosaic level services that provide these solutions enable users to locate these multiple sources online and provide a mechanism by which they can generate quotes, convert these to orders and quickly access/download that data from a common interface.

Enterprise decision makers have recognised this challenge and are beginning to demand that all parts of the business adopt a strategic, collaborative approach to their operations, including in digital mapping.

Most digital mapping users would acknowledge that there is an array of actual (typically CAD and GIS) and potential (typically modelling, management and marketing) users for data sets within any one project. These users are frequently widely distributed within one or more organisations and represent a potential overhead purely in terms of the distribution, licensing, management and update of data for a specific project, let alone the direct financial risk from duplicate purchase.

Secure, hosted services that through a common interface allow all users including sub-contractors to legitimately access and use the data, provide a live data library with clear licensing information and provide administrative tools for different levels of users answer the demands of both decision maker and user.

A recent European example of such an enterprise level commitment is that of The Italian Agency for Environmental Protection and Technical Services (APAT). They now have an interoperable cartographic reference system based on Image Web Server technology that allows simultaneous access to vector and raster cartography that is hosted on different remote servers. "Cart@net Mutiserver" efficiently services the land information requirements of APAT's 21 regional offices. Built on Earth Resource Mapping's (ERM) Image Web Server technology "Cart@net Mutiserver" provides a single point of access to different remote GIS services. GIS vector information is sourced from ESRI's ArcIMS, as well as MapServer and Geomedia. Over 1.2 terabytes of geospatial imagery is held by Image Web Server.

While the Project Managers demand…

While discovery and acquisition of digital base mapping remains a fundamental prerequisite in the early stages of a project, for the engineer and the project manager it is the ability to quickly and easily share, distribute and publish project specific 2D and 3D design information for the duration of the project that remains a serious challenge.

In this arena Autodesk's DWF format is emerging as a successor/alternative to Adobe's established PDF format as a means of sharing rich data design files electronically. This has partly come about as a result of AutoCAD's decision to make the DWF format specification open and to enable its wider adoption through the release of the Autodesk DWF Toolkit free of charge. Users can work with DWF files without having to understand the complete underlying data format while various viewers enable anyone to electronically navigate, view, and print both 2D and 3D design information.

Bentley has recently announced that MicroStation users will be able to include 3D models and animations in PDF documents, enabling AEC professionals and their clients to benefit from interactive 3D visualizations with a single click. Using the PDF files created with MicroStation, professionals, their partners and clients, and the public need only Acrobat Reader 7 to view animations and interactively explore 3D models of engineering projects.

Such enhanced access to drawing data by CAD, GIS and management highlights the need for good auditing and version management within and across the enterprise.

Year-to-year – the enterprise demands…

These organisations thus look to their single source solution provider not only for the actual data but also for a hosting facility that outsources all these overheads and ensures that no user within the organisation (re)licenses project specific data for those data sets. This level of data access and sharing maximises collaboration across the enterprise and adds real value to what might previously be seen purely as an overhead.

In the meantime, larger organisations are facing up to the need for regional, country or national coverage of medium and small scale digital mapping as a necessary overhead in the day to day management of the business, proposal preparation, research and development, marketing and much

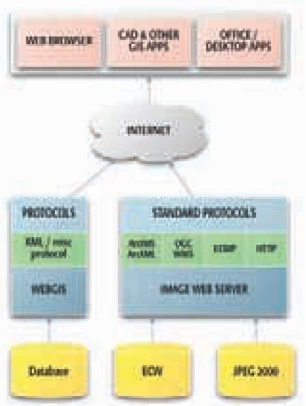


Image Web Server – a WMS compliant enterprise imagery solutions platform.

more. Such data sets are typically raster data sets (although both terrain models and vector data sets come into this category too) and as such can have a high cost of ownership in relation to the annual license fee as a result of managing updates, distribution, archiving, backup, licensing and so on.

Some may recall that in September 2003 Autodesk, Intergraph, Laser-Scan, MapInfo and Oracle introduced a real-world interoperable spatial data management platform to leverage and advance the spatial capabilities of an open spatial enterprise that enables customers to use critical location information in any IT environment and, through compliance with Open GeoSpatial Consortium (OGC) standards, with multiple applications. This "open spatial enterprise concept" continues to gain momentum, with data increasingly recognized as an organization's most valuable asset and data sharing as a critical requirement for all applications. The gradual take up of this technology is indication (if it were needed) that this is an idea whose time has come. As David Sonnen, Senior Analyst with sector pundits IDC says, "An open spatial enterprise approach enables all users and applications to share spatial data with the security, scalability and manageability of an enterprise database. This is an essential step to maximize business value in spatial information management."

And for the customer…

Some readers may have come across developments in Web or Internet map services as the related software market seeks to extend the reach of its various tools into the AEC domain; indeed DWF goes some way to enabling this. There is no doubt that these do provide a number of publishing, search and visualisation tools but they do not as yet provide a substitute for the high end analytical and processing tool sets of the CAD or GIS professional. However, as these technologies evolve enterprises across the AEC sector will look to such tools to provide internal and customer facing digital map publishing environments complete with query, retrieval and display functionality. In this role there seems little question that as the total cost of ownership of such tools falls that enterprises will see them as the final piece in the collaborative jigsaw, working with the customer!

This article was written by James Cutler, CEO at eMapSite, a platinum partner of OS – ***www.emapsite.com***



City of Bath as viewed in NavisWorks JetStream

NavisWorks JetStream

For the fourth release of NavisWorks its developers have named the product NavisWorks JetStream. Incorporating 'streaming' technology to its NWD format, there's a lot more to the latest version than a marketing facelift says Greg Corke.

Greg Corke

Product: NavisWorks JetStream **Supplier:** NavisWorks **Price:** P.O.A.

The ability to perform a 3D design/review on a moderately specified PC has been a well-documented feature of NavisWorks for many years. Indeed, not everyone has access to a high-powered workstation, and naturally project managers, sub-contractors, or clients with office-grade desktops and laptops still have plenty to say about the design/review process.

While NavisWorks has always been able to run on systems with low specified processors and graphics cards, many machines have still fallen short when it comes to the amount of memory they possess. For many users, model size and complexity has reached levels that cannot be handled efficiently by standard computers or indeed high-powered workstations, and while the model can be swapped out to the hard disk, it's not a very effective solution to a problem and sometimes it's painstakingly slow.

18 months ago NavisWorks noted that a widespread increase in model size could lead to problems for many of its users, but rather than dictate that these customers upgrade their hardware, its developers decided to investigate the potential of using streaming technology in its NWD format.

Model streaming

'Streaming' is a technology commonly used over the Internet where users can start displaying data, such as audio or video, before the entire file has been downloaded. NavisWorks JetStream technology works in a very similar way insofar as users can start exploring their models before the entire file is loaded. The intelligent streaming technology in JetStream identifies the parts of the model which the user's looking at and calls for the appropriate data to be loaded into memory. As the user navigates around the scene, new data stream-loads in the background as other pats of the model are automatically paged out.

According to its developers, as little as 10% of a file needs to be loaded before you can start navigating, and with file sizes commonly reaching 100s, if not 1000s of MBs, this can have a potentially huge impact on productivity. Furthermore, if you're working off a project Website or Intranet, NavisWorks' streaming technology can deliver huge benefits even when working with moderately-sized models.

Enhanced navigation

While JetStream Technology is arguably the most significant addition to the latest release, its developers have also answered the prayers of those that have been crying out for enhanced navigation functionality in its 'Roamer' and freely downloadable 'Freedom' modules. Real-time collision detection, gravity and third person view have all been added to this release and each of these deliver innumerable benefits.

In the past it was easy to get lost in a NavisWorks model as you could disorient yourself - this was particularly true for novice users. Now, with gravity and collision detection users can navigate a model, climb up stairs, follow the terrain, and explore models without walking through walls. Furthermore, when used in conjunction with the new 3rd person view tool, users can explore models from a 'human' perspective. JetStream includes a standard 'avatar' that can be placed in the scene, much like a 3rd person computer game, although the Avatar's legs don't actually move!

Users can also replace the avatar with any NWD file, and when used in conjunction with 'clash detection' there is the potential to verify their models. For example, a wheelchair could be inserted to check accessibility in a building, or a piece of heavy equipment could be swapped in to verify site access during construction.

Roamer also includes support for XML, which provides users with more control over managing NavisWorks projects throughout an organization. Users can import or export viewpoints, searches and search sets. (XML import/export is also available in NavisWorks Clash Detective Module).

Other new features for Roamer include redline text and tags, where users can add comments and searchable ID tags directly onto a viewpoint. And catering for the increasingly popular laser-scan surveying products, JetStream now includes support for all the major point cloud file formats.

In addition to new streaming technology, NavisWorks JetStream has enhanced its navigation tools by adding 3rd person viewing, gravity and real time collision detection.



Beyond navigation

Of course, NavisWorks goes way beyond navigation and its developers have added a number of enhancements to its complementary modules. 'TimeLiner' (construction scheduling) is now more tightly integrated to Microsoft Project with support for both planned and actual scheduling; you can set up clash queries in 'Clash Detective' using a familiar Wizard-based approach; and Presenter (visualization) has been reworked to give a five-step route to creating photorealistic output, and users can now take mapped materials direct from Architectural Desktop.

Conclusion

Software re-branding exercises are often met with a fair amount of scepticism in the industry, but in the case of NavisWorks JetStream there is actually a whole lot more to the new release than a marketing facelift. With model size increasing across the AEC sector, streaming of NWD files is sure to attract those already pushing the limits of their hardware, be that a standard office machine or the latest high-powered workstation.

However, while streaming is not going to appeal to everyone, the introduction of gravity, third person and collision detection certainly is. This functionality is long overdue and while a walkthrough with the NavisWorks avatar is not as visually attractive as a walkthrough in rival product, Walkinside from VRContext (www.walkinside.com), the ability to navigate structures on a human level is invaluable.

However, while Walkinside has the lead over NavisWorks when it comes to visual appeal, comparisons with VRContext's product end there and NavisWorks is on a different level when it comes to functionality. With modules like TimeLiner and Clash Detective, NavisWorks JetStream has all the right tools to form the cornerstone to your design/review process, from the drawing board right through to the construction process. And with support for all the major CAD applications is sure to appeal to the majority of the 3D AEC community.

Evaluation software is available on request via ***www.navisworks.com***

Revit — 2D or 3D?

To get the best out of Revit, Autodesk's new generation architectural solution, with a minimum of effort, "Model as simply as you can get away with and then detail as much as you need", says Justin Taylor of Cadline.

Justin Taylor

In the adoption of software as radically advanced as Revit, draughting processes and methodology may have to be revaluated. This process, in almost all cases, has evolved from the drawing board, and computers have been introduced to aid drawing production but not building design.

When first introduced, products such as AutoCAD delivered questionable time savings for the production of drawings - and some may still argue that a pencil and paper approach is faster - but undeniable advantages in terms of repetition and alteration. This technology focused on the two-dimensional representation of the three-dimensional world we live in.

Recently however, software manufacturers have been developing tools to allow interactive design in a three dimensional environment. The construction industry has been accused of slothfulness in adopting this approach to design long since grasped by sectors such as manufacturing and entertainment

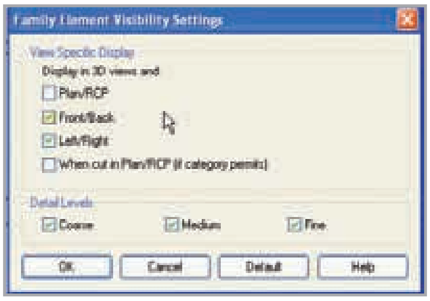
Prototyping

Rather than a series of linked drawings, which combine to form a model, Revit users produce a virtual prototype of the building and then take snap-shots of that prototype model to produce the documentation. It is a subtle shift but an important one, as the focus moves onto the design of the building, and away from the production of drawings, which become a side-effect. Accepting that for the foreseeable future the construction market will look to paper drawings for final issue and sign-off, Revit uses prototyping to approach the subject of 2D publication from a 3D perspective. This repeatedly flags up variations on the statement,

"I don't do 3D work, so I don't need to look at fancy 3D modelling packages like Revit."

This is a misnomer on a number of levels. Revit utilises three dimensions only because one of its main principles is to follow the real world scenario as closely as possible.

Figure 1 - In Revit, visibility control of 3D lines is element by element, allowing tight control over the appearance of the finished component.



And guess what? The real world is 3D therefore you do 3D work. Also, it should be borne in mind that Revit uses both 2D and 3D to achieve its goals and it is this that we are looking at here.

Should we change the way we work?

We have the ability to force Revit into working the way we always have, and in larger practices, this is often seen as the only feasible option, but if we grasp the possibilities of the technology, existing design processes can be adapted to take full advantage of the available efficiency enhancements.

At the same time, it can be an easy mistake to use any new technology for technology's sake and in doing so, lose sight of the end goal. Use of the tools becomes an objective in its own right, rather than a means to achieve a successful design, which delivers the project requirements.

One example is in the use of 3D geometry as opposed to 2D detailing. Revit is capable of modelling the building down to a very fine level of detail, which looks very nice, but is often of limited use. The vast time savings experienced in the initial concept development stage can be whittled away with petty and unnecessary 3D finery. The phrase that I often use when teaching or explaining the use of Revit is,

"Model as simply as you can get away with and then detail as much as you need."

The subject of this discussion is to look at what we can get away with and what we need. As an implementer of Revit in large-scale deployments, I normally do no more than give both sides of the argument and stand back.

Design efficiency – drawing the line

At some point in the development of the project, it becomes expedient to switch from 3D modelling to 2D detailing for the sake of efficiency, but where to draw this line? This line can either be a company-wide policy or an individual decision based on a specific scenario. Either way, due consideration must be made to the subject of pure single-building modelling versus efficient use of available technology.

In one corner we have the complex 3D component, which is anatomically correct in every way. Following the strict principles of single-building modelling, this is the ideal situation, as a section cutting through at any angle will produce a finished detail, ready to be annotated and published.

In opposition, the text-based attributes behind each component could be seen as the primary deliverables, followed by the two-dimensional detailing, leaving the three dimensional representation of the object as tertiary and

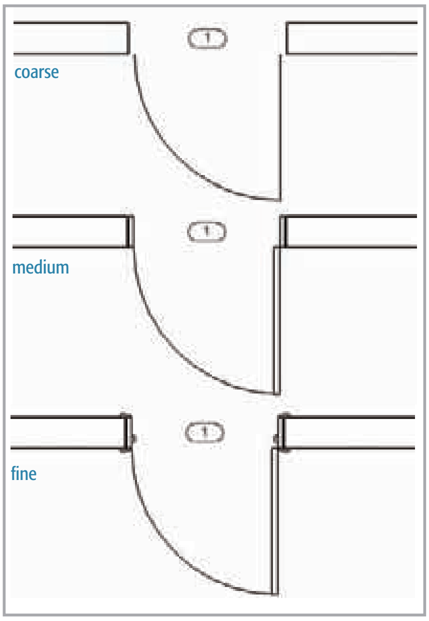


Figure 2 Revit allow users to define and control how and where we see the component depending on the view type or scale.

therefore justifiably basic. In this scenario, a handful of fundamental three-dimensional windows could be made to suffice for the majority of styles with variations handled by differing 2D details with the correct text and codes assigned in the background.

As with many things in life, the truth probably lies somewhere between the two extremes, and people should find their own comfort zone within the grey area.

How is it done?

Revit is capable of representing components differently in each view and at different levels of detail.

Within the Family Editor, which is where bespoke creation of components takes place, Revit has 2D lines for detailing and 3D lines for model representation. A 2D line can only be seen in the view it was created plus any parallel views - a line drawn in the Left Elevation will only be visible in the Left and Right Elevations - but it can still be defined as visible at any combination of coarse, medium or fine levels of detail. If we look at 3D lines, shapes and geometry, Figure 1 shows that visibility control is element by element, allowing tight control over the appearance of the finished component.

Underlying all of this graphical representation are the text-based parameters, which we assign, to provide all relevant information on schedules and material lists which is unlimited.

A practical example of where this can be useful is an electrical component such as a light switch. The important information comes in the form of knowing whether we are looking at a single gang, single way switch or a three gang, two-way switch. This will need to be called off in a material list in order to be priced and purchased correctly. This information needs then to be represented on a drawing as a plan symbol to ensure the contractor fits the correct kit. The 3D view of this component is arguably not required at all, unless internal photographic renderings are

Figure 3a - Slot drain providing a section which correctly defines the construction details, a sufficiently indicative plan view and a fairly accurate 3D model.

Figure 3b – a simplified version of the slot drain gives us the same plan and section information with a much simpler 3D model.





to be created, and if it is deemed necessary, a plain white box will probably suffice. However we decide to characterize the object in 3D, the 2D symbolic plan representation bears no resemblance.

Revit allows us to define and control how and where we see the component depending on the view type. Taking this further, we can use the level of detail – usually in 2D draughting – to show more information as we focus in at a larger scale. In figure 2, for a general arrangement drawing, the door at the top will suffice, indicating the location and swing direction, but when it comes to detailing, we require more information and so changing the level of detail will display more linework. All of which is, again, independent of the 3D representation.

2D ease versus 3D effort

Having established that we can control what we see and where we see it, I come back to my mantra, and what we can 'get away with' in simplicity of modelling. The slot drain shown in Figure 3 provides us with a section-through which correctly defines the construction details, a sufficiently indicative plan view and a fairly accurate 3D model.

The second version however, gives us the same plan and section information with a much simpler 3D model. Assuming that we will only ever be looking at the top of the object in an external perspective, this will suffice.

In both cases, here, Revit' close affiliation with AutoCAD would allow us to utilise legacy data to replace 2D detailing. The section information which is shown hatched and annotated, could have come from DWG format and imported to represent the object rather than duplicating the effort by redrawing in Revit.

Conclusion

With Revit and ADT (for much of the above is relevant for ADT also) we have design tools which can bring dramatic time savings to fruition, but they require forethought and planning to maximise this efficiency. Although not absolutely necessary, adoption should ideally lead to adaptation of process methodology. Once you start to use Revit regularly, you start to think and design in 3D, which raises questions as to the validity of constraints built around 2D drawing production.

Any product which allows flexibility in design approach can seem a brilliant idea to designers and a frightening prospect for System Managers. In practice, I spend much of my time advising how to allow sufficient flexibility within guidelines designed to control conventions and ease project information sharing without restricting design freedom.

From a manufacturing point of view, it is great to provide drawings for your customers to use, but this provides no guarantee that they won't use your drawings whilst the notes and specs point elsewhere. It is another thing altogether, however, if you can empower your customer with relevant design data, order codes, NBS specifications and everything else they need. Why would they go to the effort of looking elsewhere? As more and more manufacturers realise this, the available content for Revit grows.

www.cadline.co.uk

Product Development & Definition • Simulation & Analysis • 2D/3D Environments
Engineering Data Management • CAM & Production Simulation

sm Solid Modelling

Exhibition, Conference and Seminars NEC Birmingham, April 27th–28th 2005

The UK's No.1 event for Engineering Design Technology

There is no comparable event in the calendar where you can view the latest and best in CADCAMCAE; bringing your own knowledge up to date and allowing you to compare your own systems capabilities against what the best in the industry have to offer you.

See the newest releases from SolidWorks, PTC, UGS, AutoDesk and a whole sweep of suppliers with innovative and excellent answers to your efficiency needs and perhaps a novel way to unlock a productivity bottleneck. You'll also see software that works within or alongside the mainstream packages to extend the capabilities of your core software.

Get full use out of your visit by sitting in on one or more of our 'hot topic' sessions running throughout the day. Subjects have been voted for by readers of MCAD magazine and deal with new technology applications, problem solving, case studies and more. Entry is free and you can 'cherry pick' which sessions to attend so as to maximise your time at the show.

For many of our exhibitors, SM2005 will be the only UK show they attend this year. Whatever design engineering technology solution you seek, the chances are you'll find it at SM2005.

Opening times are 9.30 am to 4pm on April 27th and 28th 2005. For full information on the show and seminars and for on-line registration please visit **www.solidmodelling.co.uk**

To exhibit, call Lucy Mountain on 0207 681 1000 or email Lucy@edaltd.co.uk

EDA Exhibitions Ltd. 63/66 Hatton Garden, London EC1N 8SR

E D A EXHIBITIONS

prototype 2005

New for 2005 a dedicated zone for Prototyping & Direct Manufacture will address the specific needs of the Product Development community and will run as a 'show within a show' alongside SM2005. For full details -including the busy 2 day schedule of 'hot topics' hosted by the RPMA – visit **www.prototypeshow.com**

Last Years Exhibitors included:

3D Labs • 3D Systems GmbH • 3Dconnexion • ABAQUS • AceCad Software • Adobe Systems • Advantage CFD • AME Prototype Solutions • Annex Technologies • ATI Technologies GmbH • Autodesk • Blue Ridge Numerics Ltd (CF Design) • Cadassist • Camtek • Cape Engineering • CD Adapco Group • CG Tech • Cimmetry Systems • Concurrent Systems inc (CSI) • CSF • Cutting Edge • Datranet • Delcam • Design Reality • Design Rule • DriveWorks • Elton Solutions • Fluent • Informed Data Sytems • ITI TranscenData • Konica Minolta • Laser Lines • PTC • Materialise NV • Micro Concepts • Moldflow • New Technology CADCAM • Objet Geometries • Pathtrace Engineering Systems • PNY • Roland DG • Solid Applications • Solid Modelling Solutions • SolidCAM • SolidWorks Corporation • Tebis • Turn Tool • UGS PLM Solutions • Unimatic Engineers Ltd • Wilcox assoc • Z Corporation





For more information on the show, visit **www.solidmodelling.co.uk**

Generative Components

Bentley's long-term development of parametric modelling tools has finally reached the real world. The Smart Geometry Group continues to evangelise Bentley's unique approach to form design.

Martyn Day

Architectural design software comes in two flavours; 2D drawing tools with symbol libraries and intelligent 3D/2D tools that offer component-level design (walls, doors, windows). In the former you have all the flexibility and freedom of 2D representation, with the advantage of 'off the shelf' 2D libraries. The latter creates a 3D model out of components that know how to interact with one another and 2D sections and elevations are derived from this 3D model. The main downside of these modelling tools being that the components are fabricated by the CAD software vendors and limits the capability – you can't add in a structural element if there are no structural elements in the library to add.

The majority of AEC professionals will find that these two types of product will cater to most design tasks, although with 2D tools, changes and edits could impact hundred of drawings, which have to be done manually. The intelligent 3D solutions overcome this by using parametric and relationship modelling but these concentrate on producing documentation and usually fail to model buildings with complex non-standard geometry.

There are new tools emerging in the AEC market to address these complex geometric issues, together with offering design exploration capabilities. Gehry Technologies is offering Digital Project, based on Catia (a high-end, parametric, automotive and aerospace modeller) and Bentley Systems is becoming increasingly vocal about its Generative Components technology that is built on top of MicroStation. At the last few AEC events I've attended, Catia and Generative Components are becoming topics for discussion as industry people wonder what their impact will be.

Smart Geometry

One of the key groups leading the promotion of the new technologies is the Smart Geometry Group, founded by four key industry experts; Robert Aish (Bentley Systems), Hugh Whitehead (Foster and Partners), Lars Hesselgren (KPF) and Jay Parish (Arup Sport). The charity has held a number of seminars around the world, targeting the brightest young minds in and out of University/Practice to share their industry and programming experience and knowledge with the next generation. As the Group is sponsored by Bentley Systems, it is true that the key technology on display is Bentley's Generative Components, developed by Robert Aish, Bentley's Director of Research. However, you are just as likely to see other presentations, which include projects designed using Catia, Maya, AutoCAD or Rhino. The key aim of the Group is to educate the next generation of designers by introducing them to design exploration tools which need new approaches and higher degrees of geometric and programmatic skill.

The most recent Smart Geometry event was held in January at the Architectural Association School of Architecture, under the heading 'Towards a New Paradigm of Architectural Design'. Aish, Hesselgren, Whitehead and Parish, each gave a presentation on the work of students to date, together with an insight in how their practices use computers and advanced software to tackle design problems. Parish talked about wanting to be able to design a Stadium, in detail, in a day, while Whitehead worked through a few Foster and Partners projects explaining how their parametric approach to modelling allows design exploration and experimentation.

It looks as if Bentley's Generative Component technology has matured, while still in development. Hesselgren admitted that KPF was actually using it on an important live project, although he was not at liberty to say which. The work of the students was highlighted and easily demonstrated the incredible capabilities of taking a programmatic approach to modelling.

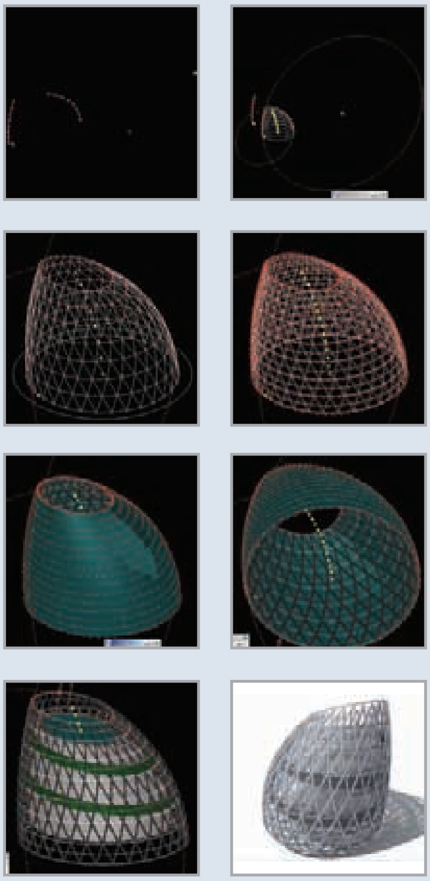
Generative Components is not about walls, doors windows, the intelligence is not at that level. As the name of the Group suggests, it's about Smart Geometry – the tool provides an environment in which geometry (lines, arcs, circles, solids, surfaces) can be related, transformed, generated and manipulated within a user-defined framework. While that might sound complicated, the end results are certainly worth seeing, complex, sculpted geometry can be quickly generated and manipulated in real-time, allowing design exploration and variation. In real-terms that could provide a practice with the ability to come up with 20 or 30 designs simply by moving sliders within a Generative Component model.

Conclusion

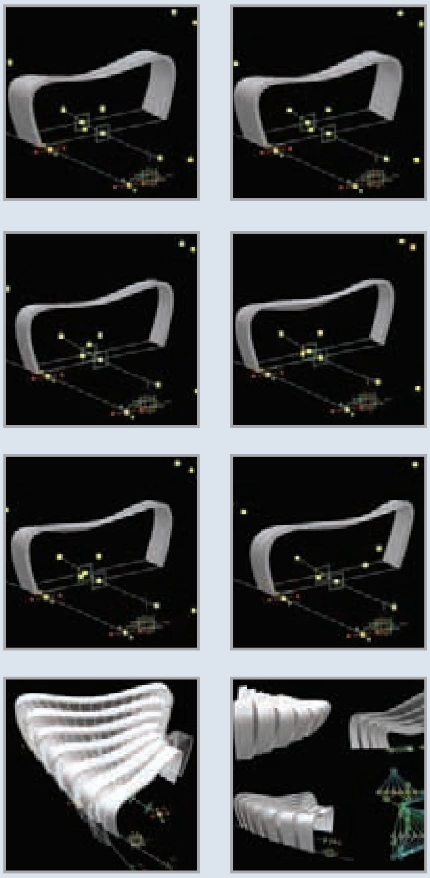
The scale and complexity of the student work is certainly getting more impressive with each event. The news that Generative Components are being used on a live project is also extremely exciting. However, to understand the technology and break down the problem into a program requires a new outlook to problem solving, and this is perhaps why the Smart Geometry Group is concentrating on new minds, as well as those special industry folks who have been struggling to find this kind of tool for years.

I think the images speak for themselves. These complex forms were all automatically generated using standard geometry, defined by the users, allowing further interaction, manipulation and refinement.

www.smartgeometry.org / www.bentley.co.uk



Generative Components - N.Y. subway station transit center, by Shane Burger, Grimshaw N.Y. Images courtesy of Grimshaw and Arup.



Arches driven by B-spline curves by Judit Kimpian, EEA Architects

HP DesignJet 4000

HP recently added a new member to its world dominating series of wide format printers. The DesignJet 4000 not only features new levels of performance, but an impressive suite of remote print management software says Greg Corke.

Greg Corke

Product: HP DesignJet 4000 **Supplier:** HP **Price:** £7,600

In the wide format printing market, colour inkjets have traditionally dominated the low-end and monochrome LEDs the high-end. In recent years though there has been a blurring of the edges with companies like Oce launching affordable monochrome volume printing solutions based on LED technology and HP raising the stakes with high throughput inkjets.

Another key differentiator has been the depth of software management tools that typically come with each technology. While your average LED solution is fully laden with a plethora of remote software tools to help manage the printer and document flow more effectively, such resources for your typical inkjet have been pretty thin on the ground. But things are starting to change.

18 months ago Oce took a new direction in the wide format inkjet market with the introduction of its 'productive wide format colour' solution, the TCS400, which offered the functionality and productivity typically found in monochrome LED systems in a full colour production level print solution.

Now HP has taken up the challenge and is offering the full complement of remote print management solutions in its brand new wide format offering, the A0+ DesignJet 4000. To facilitate this the DesignJet 4000 features a new Embedded Web Server, which enables administrators and users to manage the printer from anywhere in the world using a standard Web browser.

Users can remotely monitor printer, ink, and media status and usage and email alerts can also be provided when consumables are getting low. Multiple files can be submitted and each job can be previewed from the browser. Stored jobs can re-printed, queues can be managed, and accounting information can be viewed and saved in Excel and XML formats.

The Web-style interface looks extremely intuitive, and providing this level of remote management is sure to please those looking for flexibility and reliable throughput in their inkjet system. But while we've whetted the appetites of those that manage the system, what you all want to know is how fast you can get your drawings back and here the DesignJet 4000 is equally impressive.



Double Swath technology

At the heart of the DesignJet 4000 is a new print technology called Double Swath. Put simply this means that the machine uses two print heads for each colour (Cyan Magenta, Yellow, Black), which nearly doubles the printable area in each pass, and of course the speed of printing. To accommodate this increased printing zone (which at 6cm, is double that of traditional wide format printers) HP had to develop a vacuum system, which works in conjunction with the media feeding system to ensure accurate delivery of the paper. Sucking the paper down not only means that the paper is held in place as the print heads pass over the print zone, but ensures that the media does not expand when it takes in ink. This is particularly critical when working with plain paper.

The main benefit of doubling the size of the print zone is of course a huge increase in print speeds. As a result, the DesignJet 4000 is able to print an A1 line drawing in an extremely impressive 25 secs, which is twice as fast as HP's previous workhorse machine, the DesignJet 1000 series, three times faster than the DesignJet 500/800 series, and six times faster than the DesignJet 700 series.

Tech Specs

- Prints up to 42" (1,067mm) wide
- 2,400 x 1,200dpi resolution
- Rolls up to 90m long
- Ink supplies of 225ml & 400ml for CMY, 400ml for K
- Embedded processor and 256MB (expandable up to 512MB)
- 40BG hard drive
- Ethernet 10/100Mbps
- Firewire
- Dimensions (1,930 x 800 x 1,350mm)
- Weight (115Kg)

Price from £7,600

Real speed

While raw printing speed is hugely important, so is the processing time required prior to printing, and for some this has been a major bottleneck with previous DesignJet models. HP claims that complex files can be printed up to five times faster than with the DesignJet 1000 series. HP quotes an example of a 340MB full colour GIS PDF printed on coated/best paper, which took 2mins 11secs to process and 5mins 15secs to print on the DesignJet 4000ps. The same file took the DesignJet 1055cm plus 24mins 9secs to process and 15mins 26secs to print. This is a significant difference I'm sure you'll agree, but it's probably worth pointing out that the DesignJet 4000ps includes an embedded RIP for Adobe PDF.

Equally impressive figures are quoted when carrying out simultaneous print jobs, as the DesignJet 4000 is able to carry out raster image processing and printing concurrently. As a result, HP claims that multiple jobs sets can be printed up to three times faster on the DesignJet 4000ps than with the DesignJet 1055cm plus.

All of this increased processing performance is made possible by a brand new embedded processor, 256MB memory (expandable up to 512MB) and an internal 40GB hard drive.

Conclusion

The new DesignJet 4000 series looks to be an extremely impressive piece of kit. Moving on from where the DesignJet 1000 series left off the new machine not only takes the inkjet market to new levels of performance (both in terms of raw print speed and concurrent processing), but brings an impressive suite of remote management tools to the table.

The DesignJet 4000 is a workhorse system designed to deliver serious throughput. There are cheaper machines out there, but none can match its speed of delivery, and the good news is it does all of this without compromising on all-important print quality.

www.hp.com/designjet

Mobile workstation group test

With Intel's Pentium M processors and professional graphics solutions from ATI and Nvidia, the mobile workstation continues to go from strength to strength. AEC puts four cutting edge laptops through their paces.

Greg Corke

The mobile workstation is playing an increasingly significant role in the engineering sector. While the desktop machine will always have the edge when it comes to raw power for CAD, the latest generation of workstation-class laptops are continually closing the gap and are now able to deliver very impressive performance, both in terms of core processing and professional 3D graphics.

So what makes up a mobile workstation? Pretty much the same specification that makes up a desktop workstation – a high-performance processor, lots of memory and a professionally certified graphics card. But what you really want to know is how these portable machines shape up against their desktop counterparts when it comes to running 3D CAD?

To find out we put four mobile workstations from the major Tier One manufacturers though their paces under our standard CAD-specific workstation benchmarks. IBM supplied its Thinkpad T42p, Dell its Precision M60, HP its Compaq nw8000, and Fujitsu-Siemens its Celsius H210. However, before we get into the 'meat' of the article, a little backgrounder on the technologies that make up a mobile workstation is probably in order.

Graphics: In terms of professional graphics there are only two players in the mobile workstation sector and that's ATI and Nvidia. Both companies have mobile solutions based on their desktop workstation cards – ATI currently has its FireGL Mobility T2 and T2e and Nvidia has its Quadro FX Go700 an Go1000. All of these cards are based on AGP (Advanced Graphics Port) as PCI Express has not made it onto the mobile platform yet. However, we can expect mobile workstations based on the PCI Express graphics architecture soon.

Three of the four machines on test featured ATI's FireGL Mobility solutions, while Dell opted for Nvidia's Quadro FX 1000 in its Precision M60.

On average, the graphics drivers used on Mobile Workstations are a generation behind those used on desktop machines. This is largely down to the certification and optimisation process that all the manufacturers must go through. For example, while the current (desktop) Nvidia driver is 67.22, the Dell Precision M60 shipped to us with Nvidia's 61.76 driver, which was available on some desktop machines several months ago. Likewise, all the ATI FireGL-based machines have literally just started shipping with slightly different variants of the 8.062 driver, which was available for the desktop in Autumn last year.

> The mobile workstation continues to go from strength to strength, and performance is getting closer and closer to that of a desktop machine

Mobile technology

Processors: All of the machines on test feature Intel's new generation Pentium M processor (Dothan), which comes in speeds from 1.7GHz up to 2.1GHz, and boasts several improvements over the original Pentium M. The most notable of these is the larger Level 2 cache (2Mb) which is even bigger that the current desktop Pentium 4 (1Mb). However, the Pentium M architecture, which is actually based on the Pentium III, does fall short of the desktop Pentium 4 specification when it comes to the Front Side Bus (FSB), the speed at which the processor talks to the memory. This only runs at 400MHz, compared to the 800MHz of the desktop processor.

Centrino: For a laptop to be called 'Centrino' it must feature Intel's Pentium M processor, Intel's chipset and Intel's wireless technology. Dell's Precision M60, IBM's Thinkpad T42p, and Fujitsu-Siemens Celsius H210 all bear the Centrino logo, meaning they include all three Intel components. The specific HP Compaq nw8000 we had on test didn't qualify for the Centrino branding as it featured HP's own wireless technology.

Displays: A mobile workstation generally means a hi-resolution display with all the machines on test featuring a minimum of a 15-inch 1,600 x 1,200 flat panel screen. The Dell Precision M60 extends the screen size a little with a 15.4-inch widescreen display, which packs in 1,920 x 1,200 pixels.

With so many pixels on screen, some icons and toolbars can appear too small for some users. Windows can manage this to a certain extent by giving the user the option to change the size of icons, etc, but it's worth checking out how you get on with these hi-res displays before you make your purchase, as they can't be run effectively at lower resolutions. This is because of the number of pixels is physically built into the display.

If you decide you don't get on with hi-resolution displays, lower-resolution screens are available on some models, but bear in mind a change in resolution always takes time to get used to, and hi-res displays can be very beneficial to detailed CAD work.

»



Dell Precision M60

- £2,309 (eValue code: MAG-M60MCAD)
- 2.1GHz Pentium M processor
- Nvidia Quadro FX Go 1000
- 60Gb 7,200 RPM hard drive
- 1Gb DDR SDRAM
- Windows XP (SP2)
- DVD+ R/W
- 3.18kg
- 39mm x 361mm x 276mm

The Precision M60 is by far the biggest of all the machines on test. This is partly due to its 1,920 x 1,200 widescreen display, which despite offering unparalleled resolution was our least favourite of all the laptops. While the screen is not 'poor' by any stretch of the imagination we did find it a little too sharp for our liking, which made it look a little grainy.

The M60 continues to stand out from the crowd when it comes to core specification, as it's the only machine in our tests to offer Nvidia's Quadro FX Go1000 128Mb graphics card, and is the only one with Intel's fastest mobile processor - a 2.1GHz version of the Pentium M (765). Firewire, USB 2.0, LAN, infrared (IrDA), and Wireless LAN are all standard, but the machine only provides room for one Type I or Type II PC card.

Under our benchmarks, the Precision M60 looks like the machine to beat, delivering the fastest 3D results of all the machines, and importing the large model quicker than any other laptop on test (and even beating many of the desktop workstations currently on the market). While some of this is can be attributed to the super fast 2.1GHz Pentium M processor, we guess that the specific 7,200RPM 60Gb drive that Dell has adopted for the machine can take much of the credit here.

The Dell M60 is probably the fastest mobile workstation on the market at this moment in time, but it's also the biggest. At £2,309, it's also one of the most expensive machines on test, but swapping the high-end specification of this particular model for a slower processor, and a lower resolution display (1,680 x 1,050) can all help bring the price down, though this will be at the expense of performance.

www.dell.co.uk



Fujitsu-Siemens Celsius H210

- £1,764
- 2.0GHz Pentium M processor
- ATI FireGL T2e
- 80Gb 5,400 RPM hard drive
- 1Gb DDR SDRAM
- Windows XP (SP2)
- DVD+ R/W
- 3.20kg
- 38mm x 333mm x 285mm

Fujitsu Siemens' Celsius H210 is the most fully featured machine of those on test, with a plethora of communications and connectivity built-in including Firewire, USB 2.0, and Bluetooth. This is in addition to the now-customary modem, LAN, infrared (IrDA), and Wireless LAN courtesy of Intel's Centrino. There are also two PCMCIA slots (2 x Type I/II or 1 x Type III) and a built-in media card reader which takes SD and MMC cards.

At the heart of the Celsius H210 is Intel's Pentium M 765 (2.0GHz), 1Gb DDR SDRAM (expandable up to 2Gb), and a 5,400RPM 80Gb hard drive. Those looking to boost hard drive performance at the expense of capacity can do so with a 7,200RPM 60Gb drive, which was present in all the test machines from IBM, Dell and HP. Professional graphics are provided by the 128Mb ATI Mobility FireGL T2e, which drives the impressive 15-inch 1,600 x 1,200 flat panel, one of the best on test.

Style-wise, the H210 was a favourite of ours. We liked the look of the machine, the keyboard was well laid out, and WLAN and Bluetooth were easily turned on and off by a switch at the front of the unit. At 3.2kg, the H210 wasn't the lightest machine on test, but perfectly manageable all the same.

On test, the H210 was the slowest of all the 2.0GHz + machines on test, though only marginally. However, it had the longest battery life when running the our 3D, CPU and hard drive intensive benchmark on repeat under the standard laptop settings, though this was at the expense of performance - see box out for more info.

The Fujitsu-Siemens Celsius H210 is an excellent fully featured mobile workstation, with great looks, good performance and an extremely competitive price - the cheapest of all the machines on test.

www.fujitsu-siemens.co.uk



HP Compaq nw8000

- £2,457
- 2.0GHz Pentium M processor
- ATI FireGL T2
- 60Gb 7,200 RPM hard drive
- 1Gb DDR SDRAM
- Windows XP (SP2)
- DVD+ R/W
- 3.20kg
- 41mm x 326mm x 275mm

With its 'box-like' chassis complete with speaker grills at the front, the nw8000 is one of the most distinctive laptops on test. At 41mm it's also the thickest, and this coupled with the relatively short 'wrist area' in front of the keyboard, made it our least favourite machine for typing. Ergonomics aside, the nw8000 is a solid machine, but this sturdiness doesn't impact too much on its weight as it still comes in at a fairly respectable 3.20kg.

In terms of core specification, the nw8000 is fully laden with an Intel Pentium M processor 755 (2.0GHz), 1Gb DDR SD RAM (max 2Gb), a 128Mb ATI Mobility FireGL T2 graphics and a 60-Gb 7,200 RPM hard drive. The machine we had on test featured an impressive 15-inch 1,600 x 1,200 display, though lower-res 15 inch screens are also available in 1,024 x 768 and 1,400 x 1,050 configurations.

Communications are taken care of with the standard LAN, Modem, WLAN (802.11b/g), and Bluetooth, and the nw8000 can hook up peripherals via USB 2.0, Firewire, or infrared. There's also provision for two Type I/II or 1 Type III PCMCIA cards and a SD flash memory card reader to enable data to be taken directly from digital cameras, PDAs or mobile phones.

Under our 3D benchmarks, the nw8000 was the second fastest machine on test, just behind the Dell Precision M60, and our large model import test showed it to be on par with the Fujitsu-Siemens Celsius H210, though again behind the Dell machine.

There's a definite feeling of quality with the nw8000, and together with impressive performance, HP's mobile workstation is still well worth a look despite its price tag. However, if you are likely to do a lot of typing, we'd strongly recommend an extended trial to see how you get on first. Though we'd propose you do this with all machines prior to purchase anyway.

www.hp.co.uk



IBM Thinkpad T42p

- £2,170
- 1.7GHz Pentium M processor
- ATI FireGL T2
- 60Gb 7,200 RPM hard drive
- 1Gb DDR SDRAM
- Windows XP (SP2)
- DVD Multirecorder
- 2.80kg
- 30mm x 330mm x 269mm

The Thinkpad T42p is the smallest, slimmest, and lightest of all the machines on test, and as such doesn't really look like a workstation-class laptop. However, with a Pentium M 735 (1.7GHz), 1Gb DDR SDRAM, 7,200RPM 60Gb hard drive and ATI Mobility FireGL T2 it has all the characteristics of a CAD-capable machine and our benchmark figures backed this up.

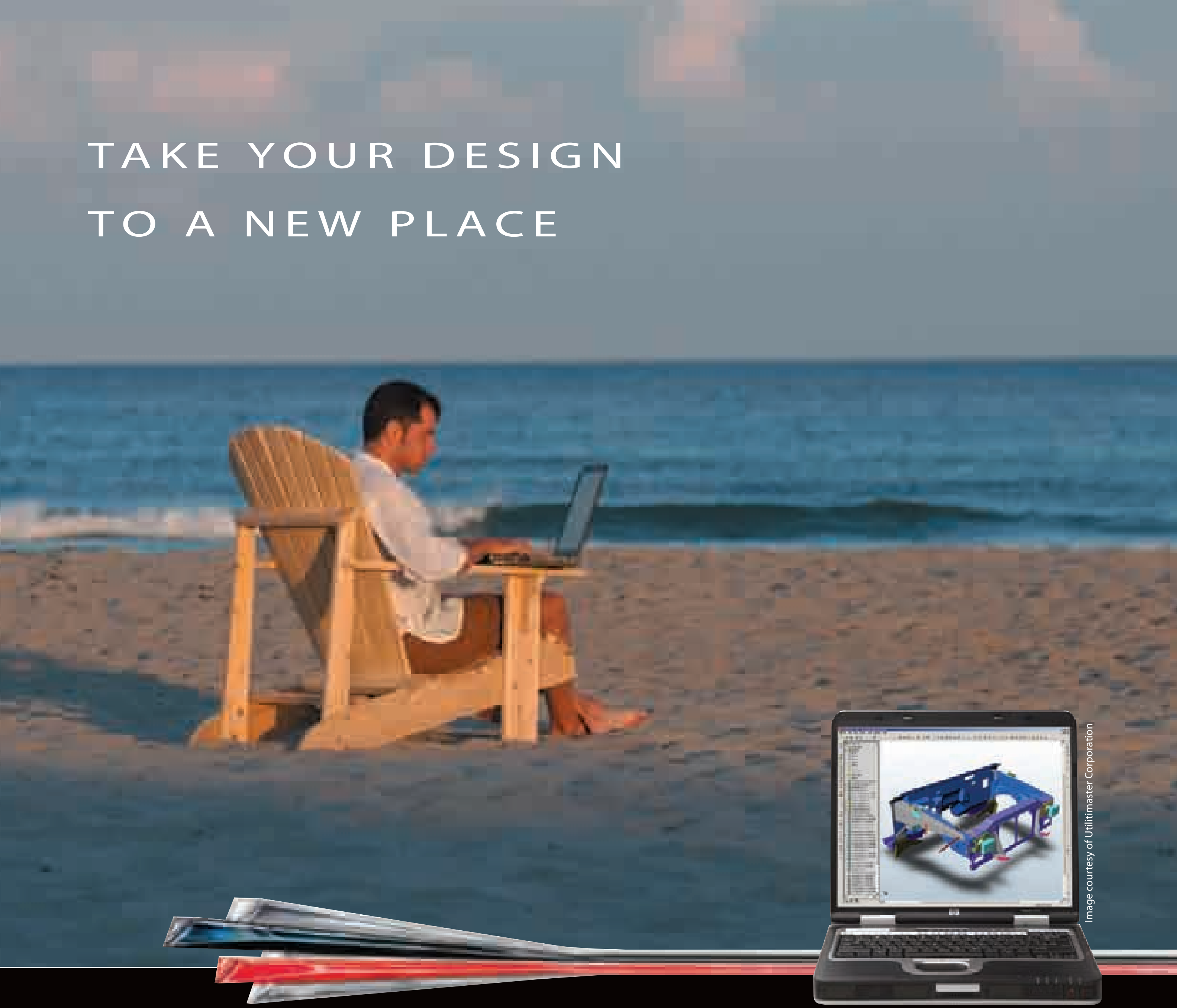
Despite its 1.7GHz processor, the T42p was not far behind the other machines in its class, performing solidly under our 3D tests. However, the T42p was noticeably off the pace under the large model import test where the machine was around 30% slower than the fastest machine, the Dell Precision M60. In terms of battery life, the T42p ran out of juice quicker than the other machines on test when running our CPU, hard drive and 3D graphics intensive benchmark.

Despite its compact size, the T42p still boasts a 15" display with the workstation standard 1,600 x 1,200 resolution. With a slightly tapered profile the keyboard was particularly comfortable to use, though we weren't overly keen on the mouse buttons, which required a lot of travel before they clicked in to action.

Features-wise, the T42p includes USB 2.0, Bluetooth, modem, LAN, infrared (IrDA), and Wireless LAN as standard, though there is the notable omission of Firewire and like the Dell Precision M60 there's no media card reader. However, there's still room for two Type I/II or 1 Type III cards. A DVD Multi-recorder rounds off the feature set.

With its 1.7GHz processor (1.8GHz model is also available), the IBM's Thinkpad T42p is not the fastest of the machines on test, and battery life was a little below par. However, it is by far the most portable machine, both in terms of size and weight and for this it deserves particular attention.

www.ibm.co.uk



Finally, a complete mobile CAD solution designed to deliver the power and graphics performance of a workstation with the mobility of a notebook. The HP Compaq nw8000 Mobile Workstation powered by ATI's™ MOBILITY FireGL™ T2 graphics provides design engineers with real-time rendering performance when running Autodesks® Revit®, Architectural Desktop®, discreets® 3dsmax® or any of the other leading mainstream 3D design software.

Mobile performance lets you take your designs to new and interesting places. You can work anytime, anywhere with the reliability of HP combined with the graphics power of FireGL™, the real-time rendering feature available within these packages allows you to more effectively visualise how designs will look and perform before they are made while on the move or on the beach!

hp invent®

ATI™ FireGL™

WORKSTATION GRAPHICS ACCELERATORS

http://www.ati.com/products/mobilityfglt2/index.html

Test setup

We tested the four machines running off mains power with a suite of 3D CAD benchmarks. We also tested the processing power and hard drive performance of the machines with our large model import test, which measures how long each machine takes to import a STEP model and save the individual files back in to one of the leading CAD applications, SolidWorks.

In addition to our standard workstation benchmarks we also carried out an investigation into battery life. We found some very interesting results here, with a serious trade off between performance and battery life depending on which power settings you use. See box out for more info.

Conclusion

The mobile workstation continues to go from strength to strength, and performance is getting closer and closer to that of a desktop machine – and even faster under certain applications! Indeed, while one 3D test showed that mobile workstations delivered about two thirds of the 3D performance you'd expect from a typical desktop workstation (CAD 2's PNY Quadro FX 540-based Pentium 4), another test showed that the HP nw8000 was actually head to head with our reference desktop machine, and the Dell Precision M60 actually beat it. The Dell Precision M60 also deserves a special mention for its performance under the large model import test, where again it challenged its desktop counterpart.

Battery life vs performance

IN MAKING a workstation 'mobile' there is always going to be a huge trade off between how fast your machine performs and how long its battery lasts. When running off batteries all modern laptops are designed to save power - by slowing down the CPU or graphics card, turning down the brightness of the display, or going into standby mode whenever possible.



This is all well and good if you're writing an email or editing Word doc, but CAD requires performance, and those working on large assemblies are not going to be satisfied running their workstations at half speed.

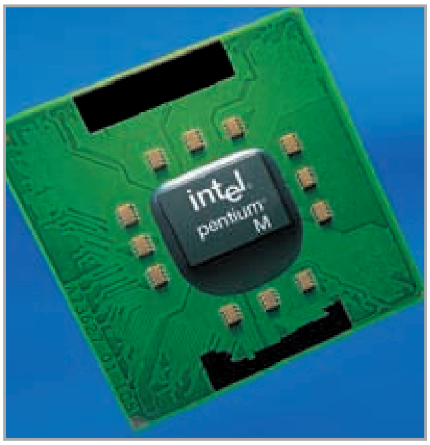
In order to help manage your battery life most effectively, Windows has a number of built in power schemes, which control the speed at which each of the core components run and when they go into 'standby'. This includes the default 'Portable/laptop' setting for mobile workstations. However, our tests show that the way in which each manufacturer implements this power mode can make a huge difference to performance and battery life.

This was illustrated by running our 3D, CPU, and hard drive intensive benchmark on a continuous loop until the battery ran flat. When using Windows' portable/laptop setting the Fujitsu Siemens Celsius H210 outlasted the competition significantly, but when we looked at the performance you got under this mode it was significantly slower than any other machine on test. Conversely the Dell Precision M60 was one of the first to run out of juice, but it performed nearly as quickly as it did when running off the mains. Battery life was significantly improved when we changed the setting to 'maximum battery life', but performance took a huge drop. For the Fujitsu-Siemens Celsius H210, changing the power settings to 'Always On' brought the performance right up, but at the expense of battery life.

For the level of performance it gave, the battery life on the IBM Thinkpad T42p was noticeably less than the other machines on test. In fact we tried out a number of settings including 'Always on' and 'Desktop' and couldn't get the machine to perform anywhere near the speed it did when it was plugged into the mains. The same was true of the HP Compaq nw8000, but it should be noted that we didn't exhaust all the available power options here. If high performance computing is essential when running off battery power this is worth checking out with HP and IBM prior to purchase (or maybe someone from IBM and HP would like to verify this).

We're not going to publish any exact figures for battery life as there are so many variables to take into account. However, under standard operating conditions we'd expect all the mobile workstations to last over three hours. All machines have a dual battery option, which is a great investment if you're away from a mains socket for extended periods.

In conclusion, it came as no shock that there is a big trade off between performance and battery life on mobile workstations. What did surprise us was that there was such inconsistency between how each manufacturer manages this under the standard Windows portable/laptop power setting. For this reason, it's worth gaining some understanding of how each Windows setting affects your machine. For example, there's little point in running your workstation at near full speed with the default portable/laptop setting on the Dell Precision M60 if you're only working on small CAD parts or writing emails.



Intel's Pentium M is at the heart of all the mobile workstation on test and offers 2Mb Level 2 cache, more than the desktop Pentium 4 processor.

However, while the performance gap is continually closing, there is still a significant price difference between the deskbound and mobile workstation, which is exaggerated when you start to add more RAM. For example, you'd need to pay an additional £1,140 to upgrade the Dell Precision M60 from 1Gb to 2Gb RAM. This is due to the increased cost of having to use 1Gb DIMMS, which are far more expensive than 512Mb DIMMS.

Comparisons with desktop machines aside, the mobile workstation is designed to be portable, and while many users simply need to be able to take their workstation from site to site, others may need to carry out compute-intensive CAD work when running off battery power. And with the balance between power consumption and performance varying so greatly between machines, it's important to understand your settings to get the most out of your mobile workstation.

In summary, I'd recommend any of the four workstations featured on test. Dell's Precision M60 made its mark by delivering the most impressive performance figures and while its widescreen display may be an attractive proposition to some, the size may be off-putting to others. IBM's Thinkpad T42p scores highly by cramming so many hi-spec components into such a compact unit. However, in doing this there is a trade off in battery life and performance. HP and Fujitsu-Siemens take the middle ground with their respective machines. Both the nw8000 and Celsius H210 combine solid performance with the full complement of mobile features, but the Celsius does all this with an extremely competitive price tag.

As a closing note, many of you will be aware that new mobile workstation products, based on PCI Express and new Intel chipsets and processors, will be available soon. And this might make some of you a little wary of investing in a mobile workstation at this moment in time. My take on this is that technology is constantly evolving, and as we found with the first generation of desktop PCI Express machines, newer is not necessarily better.

High-end 3D CAD on the move is already a reality, and if you're frequently on the road it could be time to replace your desktop machine.

PC Workstations: hard disks

Robert Jamieson

In the latest instalment of his series of articles which look at the components of a PC workstation, Robert Jamieson gives us the low down on hard disks, their physical characteristics and which are best for CAD.



The hard disk is the slowest component (bar floppy and CDs) that is used in a modern workstation. This means it has more effect on the total performance than most people realise. Even if you work from a network, loading up applications, or using the pagefile, will all be done locally using the hard drive. Most CAD applications put some of the loaded information into the pagefile or at least create temporary files which all sit on the hard drive.

Physical characteristics

I will first go through the physical characteristics of what a hard disk is. Hard disks are mechanical devices. As a result they fail more than any other device in a computer. Each hard disk has a rotating platter (glass for example) coated in magnetic media. These spin at different rates from 4,200 RPM to 15,000 RPM in the latest SCSI (Small Computer System Interface) models. A drive can have multiple platters depending on the amount of storage it has. The data is read and written to this by a head that tracks across the spinning disk. In the old days the disk would spin three times before the data was read off but today it's all read in one go. Each drive has its own RAM or Cache on the drive and this ranges from 2Mb to 16Mb. Drives are measured in access times and data transfer.

Workstation disks fall into two main categories IDE (Integrated Drive Electronics) and SCSI. SCSI was the traditional workstation drive and attracted the latest technology in spin rates and cache. SCSI needs a dedicated intelligent controller card or high-end motherboard to support the drive. The Ultra 320 standard is the latest SCSI generation. The problem with SCSI is the cost of each drive is more and the controllers aren't cheap either. IDE, on the other hand, has drive controllers embedded on each motherboard and the IDE drives offer cheap reasonable performance. The current sub types of IDE drives are parallel and serial.

Parallel ATA is the primary internal storage interconnect for the computers, connecting the host system to peripherals such as hard drives, optical drives, and removable magnetic media devices. Parallel ATA is an extension of the original parallel ATA interface introduced in the mid 1980s and maintains backward compatibility with all previous versions of this technology. The cable standard is 40-wire cable, which has been replaced by an 80-wire version for the Ultra standard. These are often "round cables" to improve airflow.

Serial ATA is an update of Parallel with better interface speed and cabling. They also require a different interface and are not interchangeable with Parallel ATA. However, you can get an adapter to fit a Parallel ATA drive to a serial controller. There is no great improvement of performance between PATA and SATA – it's more of a future standard that will give improvements once the mechanical performance of drives improve. New SATA drives support NCQ technology, which can manage the internal queue in which commands can be dynamically rescheduled and reordered. This is supported on Intel's 925 chipset, for example. This looks to be a good technology and shows that the various manufacturers have put a lot of development into SATA.

Raid

There is a lot of talk about whether or not RAID (Redundant Array of Independent (or Inexpensive) Disks) gives increased performance. RAID is where several physical disks are combined into an array for better speed and/or fault tolerance. A Level 0 Raid array implements data striping where file blocks are written to separate drives. The setup doesn't provide any fault tolerance, because failure of one drive will result in data loss and this actually increases MTBF (Mean Time Before Failures). However, in practice a Level 0 array does help the performance of intensive applications quite a bit.

Level 1 implements data mirroring. Here, data is duplicated on two drives either through software or hardware. It provides faster read performance than a single drive. Level 3 requires at least three drives. Data block is striped at byte level across drives and error correction codes (parity info) is recorded on another drive. Provides fault tolerance but slower writing performance. Level 5 improves performance but also striping parity info across multiple drives and provides redundancy for three or more drives.

RAID can be implemented in IDE (PATA and SATA) and SCSI. However, the cost of some of the controllers with extra cache is quite a lot and often more of a technology for a server than a humble workstation. A lot of the newer motherboards come with RAID onboard for IDE, which means you need only an extra drive to have one. However, a lot of larger manufacturers don't give you the option as it's harder to pre-install Windows (the RAID has to be functioning before the OS is installed).

What's a hard disk cache?

The controller on a drive copies the most recent access information into the RAM or Cache on the hard disk. The algorithm that controls this has an effect on what is copied. The RAM is 10x faster than accessing the physical platters »



IDE drives are available in both parallel and serial formats and can provide a cost-effective performance solution when Raided (Seagate Barracuda 7200.8 pictured).



« SCSI hard drives have the latest technology in spin rates and cache but are expensive and the controllers aren't cheap either (Seagate Cheetah 15,000RPM pictured)

and if the data is accessed again, it's supplied faster.

What does CAD need

Now I have talked about the physical hardware – lets look at what's best performance for CAD? SCSI still just gives ultimate performance in a RAID array. This is expensive and an IDE RAID setup with high performance IDE drives is good and a lot more affordable. The thing about IDE drives is there is a great range from entry-level to performance, whereas practically all SCSI drives are performance drives so you always get a good one. The performance of a single top end IDE drive can be good enough for most CAD applications.

I have seen tests in some computer magazines stating that RAID doesn't make any difference; this is because they tested loading games which are single large files. An assembly of a 3D model would have a lot of smaller files often repeated. Imagine how many nuts and bolts are in a given assembly. If the drive or RAID has a large cache which is RAM (RAID 0 doubles up the cache) this bolt would come from the cache and therefore load faster and not need to access the platters. This is also true when saving or closing an application where the data has to be written.

This is all OK if you are buying a new computer but what can you do to improve your current performance? Defragment your drives! As data is written to drives it's placed in the first available space. After a while as data gets deleted and replaced with bigger files the hard disk gets messy with a single file spread all over the disk. The standard defragmenter in Windows is a start but 3rd party defragmenters are a lot better and can put the applications and most recent access data together. Some can even defragment the pagefile and put it at the front of the disk. Why should this make it faster?

If you look at the disk platter the outside edge track covers more distance in one revolution than the inside edge track. The areal density is the same – this can account for 20% difference in performance from the front of the disk to the back. This is also why disks with increased areal density have better transfer rates. For this same reason it's better to keep the disk half full. With the sizes available today in IDE drives this should not be a problem. One tip on defragmenting from old – after you have defragmented a drive restart the computer and don't run other applications while it's working. This will stop applications going for data that's been moved.

Reliability

As I said at the beginning drives will always fail. Hard Disks will fail when they are new i.e. manufacturing defect or when the bearings have worn out after extended use etc. It's a good idea to test a new system before it's put into a production environment and likewise cycle out two year old drives that have had a hard life. Different manufactures have different track records with reliability. I have a large collection of two to three year old drives from one manufacturer that have all failed with similar faults. I'm not buying them again! Some of the bleeding edge stuff tends to have slightly more problems – a candle that burns twice as bright lasts half as long.

If I'm saying drives fail, why increase data loss chance by using RAID 0? I have been using SCSI RAID and now IDE RAID 0 for ten years and as long as you have good backup and replace drives after two years, I will still take the chance. I want the performance it offers!

*Robert Jamieson works for workstation graphics specialist, ATI – **rjamieson@ati.com***

Adobe® Acrobat® 7.0 Professional

Think you know Acrobat?

Think again.

Introducing Adobe Acrobat 7.0 Professional, the easiest way to streamline your engineering document workflow. Use it to create, control and deliver secure and polished engineering documents – and for fast and easy document reviews, by extending all the familiar commenting features to your teams using the free Adobe Reader 7.0.

Better by Adobe™.

Visit www.adobe.co.uk/acrobat

FREE Adobe Acrobat 7.0 Training coming soon to a town near you

Bristol...London...Birmingham...Manchester...Sheffield...Leeds...Edinburgh

To register visit www.adobe.co.uk/thinkagaintour40

Adobe®